Adaptation to flooding in the Resistencia city region, Argentina: Planning and its impact upon the poor

Thesis submitted in accordance with the requirements of the Liverpool School of Tropical Medicine for the degree of Doctor of Philosophy (Global Health) by Neil Whittingham

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Photo ii.1. The clean-up, Antequeras, Chaco, Argentina
(Oil on canvas by author, 2019**)**

Abstract

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Given the complexities involved in the flooding of city regions and the threats of Climate Change, development policymakers and practitioners need to identify factors that have a bearing on coping and adaptation to flood-prone environments and understand the opinions and behaviours of societies and stakeholders at the local level. In doing so, more responsive and socially and environmentally just adaptation processes and measures can be fashioned in line with the targets of the UN Sendai Framework. To gain further insight into the experience of flooding for a city region from both 'top-down' and 'bottom-up' perspectives, a qualitative methodology of semi-structured interviews was used in this study to unearth perspectives on flooding of professionals and politicians and poor flood victims who have experience of it in the Resistencia city region in Chaco province, Argentina. Responses were presented using the framework suggested in the work of Wamsler and Brink (2015), i.e. based upon whether they related to: i) Reduction and avoidance of flooding hazards; ii) Reduction of vulnerability to flooding; iii) Preparedness for responding to flooding; iv) Preparedness for recovering from flooding. The data revealed a striking difference in perspectives on flooding between 'top-down' of authorities and the 'bottom-up' perspectives of poor flood victims. Intense rainfall continues to be a major contributory factor to ongoing flooding in the area though a 'blame culture' exists whereby city authority representatives often see poor flood victims as playing a significant role in their own suffering, whilst many poor flood victims considered there to be an urgent need to reduce vulnerability and had considerable disappointment with the role being played by what they perceived to be disorganised and corrupt government. It was clear that insightful poor flood victims wished to be more involved in formal planning for the area, however political processes in the Resistencia city region lacked transparency and there was a tendency for the poor to feel there was little choice other than responding themselves to the risky circumstances they faced. The study revealed a clear wish for better balance between pre- and post-flooding adaptation measures including better maintenance of drainage systems and a wish for a more transformational culture that fosters sustainable development with broader consciousness with regard to disaster risk reduction, a more pro-poor focus and better coordination/co-operation amongst different sectors, with formal political processes for adaptation that are more transparent and participatory. The study provides support to the growing body of literature that asserts that, as well as engaging with the technical challenges of flood risk, those working in development need to appreciate socio-political context, and how it determines how benefits and costs of adaptation are distributed, so that the adaptive capacity and resilience of the vulnerable poor can be bolstered.

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I hope the incomplete list of names goes some way to not only show appreciation for help received but also show acknowledgement that a project such as this is, above all else, a collaborative endeavour. I am extremely grateful to the interviewees themselves for giving their time so freely and cooperatively. I have sought to faithfully represent their opinions after they placed their faith in me. Finally, I wish to acknowledge the support of my father George and my mother Cassie who sadly passed away before I completed this project; I hope both she and my father are proud of my efforts.

List of acronyms and abbreviations

APA	Administracion Provincial del Agua (Provincial Water Administration)
DRM	Disaster risk management
DRR	Disaster risk reduction
IPCC	UN Intergovernmental Panel on Climate Change
IPDUV	Instituto Provincial de Desarrollo Urbano y Vivienda
PRINCE2	Projects In Controlled Environments (Project management method)
SAMEEP	Servicio de Agua y Mantenamiento de Empresa del Estado Provincial (Provincial Water Service and Maintenance Company)
SDG	UN Sustainable Development Goal
Sendai Framework	UN Sendai Framework for Disaster Risk Reduction 2015-2030
SUPCE	Subunidad Provincial de Coordinación para la Emergencia (Provincial Subunit for Emergency Coordination)
UN	United Nations
UNDRR	UN Office for Disaster Risk Reduction (Formerly known as UNISDR)
UNFCCC	UN Framework Convention on Climate Change
UNNE	University of North East Argentina
WHO	World Health Organisation

CHAPTER 1

"What the heart knows today the head will understand tomorrow"
(James Stephens, The Crock of Gold)

Introduction

This introductory chapter states the purpose and overall aims of the research and provides justification for it. Following an introduction to the researcher, there is a brief summary of the broad challenges faced in addressing the research aims. A brief contextual description of the environment, economy and society of the Resistencia city region is then provided and, lastly, there is a brief outline of the remainder of the study before Chapter 2 provides a review of literature.

The statement of purpose and overall research aims

Submitted for the purposes of the doctorate in global health, this study aims at a deeper understanding of attempts made to cope with flooding through investigation of the particular urban and regional planning and adaptation measures that have been undertaken within the flood prone city region of Gran Resistencia in the province of Chaco in the north of Argentina. This research examines attempts to cope with flooding by the government and explores the perceptions, experiences and actions related to flooding amongst professionals and politicians and, at the household level, amongst poor flood victims themselves. The study of the Resistencia city region aims to provide valuable qualitative data that could contribute to further research and to pro-poor policy, planning and practice related to adaptation to flooding for the area. In addition, the undertaking of the project has given the researcher the opportunity to examine relevant disaster risk reduction literature, and to develop capacity in the management of research related to international development. Also, it is hoped that the elicited observations and recommendations can enhance the health resilience of the poor in the area and, perhaps, those in resource-poor city regions prone to flooding elsewhere.

Justification for the study

It is widely accepted that processes related to urbanisation, industry, transport and agriculture have affected natural cycles of climate change, and concerns over future sustainability have subsequently taken on a primacy within international development discourse (Dow and Downing, 2006; Adams, 2009; Houghton, 2009; Dessler, 2012; Middleton, 2013). The vast majority of scientists agree that significant rises in global temperatures due to human activities look set to lead to further drought, melting of glaciers, sea level rise and widespread flooding, with huge social and economic consequences (Stern, 2007; Clark, 2013). The forecasted impacts of climate change across the world vary considerably depending on the scenario, the estimates made of finite fossil fuel resources, and the choice of forecasting technique used. However, rises in prices of water and food look set to lead to a greater degree of food insecurity, dehydration, nutritional stress, mental health issues, political unrest and increased migration (Halsnaes and Veje Laursen, 2009; Munslow and O'Dempsey, 2010). The many implications for the health and wellbeing of populations include heat stress, spread of disease and problems in accessing fertile land and potable water (Black and King, 2009).

Major flooding events can be overwhelming in scale, with the livelihoods of many millions of people at stake. Flash flooding and landslides in Pakistan in 2010, for example, killed and injured approximately 2000 and 3000 people, respectively, and, according to National Disaster Management Authority estimates, affected a total of 20 million people (World Bank, 2010; Dinwiddie et al., 2011). In regions with hot climates, flooding can involve more than just the immediate physical risks and the reduction of crop yields; it can lead to an increase in waterborne diseases, such as dysentery, typhoid, cholera and snake bites and an increase in diseases borne by mosquitoes, such as yellow fever, malaria and dengue fever (Dow and Dowling, 2006; BBC, 2011; Wearne, 2011). Clearly, the poor and vulnerable are subject to economic pressure to live in hazardous locations and are least likely to be able to cope with the aforementioned forecasted impacts, with climate change exacerbating the difficulties faced in securing a sustainable urban livelihood (O'Donovan, 2008; Dow and Downing, 2011, Pelling, 2011). Over half of the growing world population are now considered to be urban, and most growth in the world population over the next two

decades is expected to be in urban areas in poor regions (Satterthwaite et al., 2009). The Special Report of the Intergovernmental Panel on Climate Change (SREX) noted that, regardless of whether extreme weather events, due to natural or manmade causes, have increased in magnitude and frequency, the increasing amount of people and assets in the world has huge implications for disaster risk (IPCC, 2012).

From 2000 to 2014, the proportion of the urban population of the world living in slums is reported as having fallen from 28.4% to 22.8%; however, given the rising world population in general and the trends towards increased urbanisation in the developing world, there has been a considerable rise in the actual number of people living in slums during that time from 807 million up to 883 million (UN, 2018). So, with the unprecedented rise in the level of urbanisation in recent decades, there is an ever present need to plan and manage city regions in sustainable ways that are mindful of the health, wellbeing, and rights of their current citizens and future generations (Morvaridi, 2008; Pieterse, 2008). As the global population rises and greater numbers of people are forced to live in areas prone to flooding, appropriate forms of pro-poor regional planning are increasingly being seen as essential. The United Nations (UN) has sought to highlight the importance of effective practice in urban planning and management to deal with future challenges with UN Sustainable Development Goal (SDG) 11 ('Make cities inclusive, safe, resilient and sustainable'). Indeed, SDG Target 11.B. aims at a substantial increase in adoption and implementation of policies and plans for urban areas that are integrated for greater adaptation and mitigation with respect to climate change, inclusion, greater resilience to disasters and efficient use of resources, as well as the development and implementation of holistic forms of management for disaster risk to align with the Sendai Framework for Disaster Risk Reduction 2015-2030 (UN, 2018). To help city regions be more prepared for both current and future risks and better inform policymakers, planners and communities, efforts need to be focussed on helping the most vulnerable amongst urban dwellers through more socially-oriented and responsive forms of adaptation (Black, 1998; Davoudi, Crawford and Mehmood, 2009; Howard, 2009; Pizarro, 2009). There is an apparent need for research aimed at providing insights into the socio-political and economic factors that lie behind the adaptive capacity of people and their attempts to cope with risk (Pelling, 2011; O'Brien and O'Keefe, 2014; Ensor et al., 2015; Wamsler and Blink, 2015).

It is clear that sustainable development cannot just be left to governmental politicians and planners and the call for greater public participation in urban and regional planning is now mainstream (Giddens, 2009). UN Secretary-General Ban Ki-moon signposted a shift in policy emphasis in introducing the United Nations Plan of Action on Disaster Risk Reduction for Resilience in 2013, stressing that "To reduce risks from disasters, we must mobilize a broad coalition of partners, from village chiefs to government ministers, from family-run shops to international corporations, from school principals to hospital directors" (UN, 2013d, p.3). So, as well as the need for more integrated and pro-poor approaches to urban and regional planning, there is greater recognition of a need for more inclusive and collaborative approaches for disaster risk management as the call for greater public participation has become mainstream. There are, however, differing forms of political space within a city region through which people may be engaged in civic matters, with varying degrees of formality. So, a comprehensive awareness of the various approaches and practices taken in a city region to cope with flooding ought to involve a clearer understanding of the phenomenology of adaptive capacity, with a genuine appreciation of both the formal and informal aspects of disaster risk reduction (Pelling, 2011).

This thesis is registered with Liverpool School of Tropical Medicine (LSTM), the vision and mission of which, respectively, are: 'To save lives in resource poor countries through research, education and capacity strengthening'; and 'To reduce the burden of sickness and mortality in disease endemic countries through the delivery of effective interventions which improve human health and are relevant to the poorest communities' (LSTM, 2019). Given the thesis considers the vulnerability of people in the face of flooding in a particular city region, it too is, in straightforward parlance, a health-related study. As a doctorate, the thesis is nested within the field of 'global health', a term that became increasingly accepted with globalisation, the evolution of environmental movements and with a broadening of the interests of the World Health Organisation (WHO) (Brown, Cueto and Fee, 2006). WHO (2012) note the importance of local knowledge and management of risk and the building of resilience to help reduce the impacts of disaster upon health. Also, within the UN system, the Sustainable Development Goals (SDGs), particularly SDG11, target more integrated policy and management for better mitigation and adaptation for urban centres and greater resilience with respect to disaster. More specifically, Target 11.B of the

SDG11 encourages alignment of policy and practice to measures noted in the Sendai Framework for Disaster Risk Reduction 2015-2030 (Sendai Framework) and by its custodian the UN Office for Disaster Risk Reduction (UNDRR, 2019).

It is apparent that, along with the promotion of inclusion and participation in civil society, further insights into how various levels of governance are addressing and living with environmental change in flood-prone areas are both necessary and welcome (Pelling and Wisner, 2009; Wamsler, 2014; Ensor et al., 2015). As Resistencia city region is very prone to flooding, and has a complex mixture of social, political and environmental challenges, there is a need for greater insight into adaptation to flooding in the area. A case study of the experience there, from both 'top-down' and 'grassroots' perspectives, then, is in keeping with the Sendai Framework and can contribute to a better understanding of adaptation and planning processes at various levels. Insights gained could enhance the resilience and wellbeing of vulnerable poor communities through informing, supporting and/or bolstering capacities of both supportive professionals and vulnerable communities in the Resistencia city region and could have relevance for other areas.

Introducing the researcher

Having originally studied geography and worked in community-based environmental work, I trained as a town and regional planner and have worked as such in both England and Ireland.

Photo 1.1 The researcher

I wished to change direction in my life and career and so I self-funded further study in the field of international development/humanitarian work. The research project presented the opportunity to galvanise skills in the research of development issues in the hope that it makes a contribution towards the search for more equitable forms of adaptation to disaster risk and climate change.

Summary of broad challenges in addressing the research aims

In general, the challenges faced in undertaking this research can be split into matters of theory and method, on the one hand, and matters of logistics/implementation on the other. In terms of theory and method, it is clear that the study has a solely qualitative focus. Further quantitative data could have been sought, perhaps through a questionnaire used within a mixed method research approach to elicit much needed numerical statistics with regard to the experience of flooding. However, in achieving ethical approval for study through collaborators in both the UK and Argentina, it was decided that, given the constraints in time and financial resources, the value of the research would be optimised through focusing upon gathering information with regard to perceptions of relevant stakeholders. Despite this simplification, the actual data collection process presented numerous logistical challenges. To collect sufficient data from an adequately sized sample of appropriate participants, there was a need to network with academics and community representatives and identify and train willing voluntary bi-lingual assistants. Effectively, the research project became a sizeable, time-consuming and collaboratory undertaking requiring diplomacy and management skills and, ultimately, the generosity of a number of very helpful people; hopefully, the acknowledgement section above goes some way towards giving helpers/collaborators some due recognition in the absence of financial reward. Having gathered the data, a key challenge has been to consider it all once back in the UK and to interpret it in a streamlined way that addresses the research objectives and provides meaningful focused insights relevant to adaptation to flooding; an analytical task that called for many hours and much patience.

A brief contextual description of the Resistencia city region

Resistencia is the capital of the Chaco province in northern Argentina and lies within the southern part of the vast geographical region known as the Gran Chaco, a lowland plain reaching from northern Argentina into Paraguay and Bolivia. Resistencia, Barranqueras, Fontana and Puerto Vilelas now form the municipal area of Gran Resistencia, with a population of approximately 400,000. Many poor people have migrated to the urban Resistencia city region from the countryside in search of better

economic fortunes and many have moved to hazardous informal settlements/slums of which there are two hundred in the urban Resistencia city region with approximately a third of the local population (Municipalidad de Resistencia, 2006). There is a multiplicity of issues of extreme poverty, poor environmental conditions, vulnerability and consequent health problems for many of those who have lived and/or are living with conditions of flooding in Gran Resistencia. For many years, major flooding events in Chaco led to the extensive regional planning and adaptation measures and more immediate coping strategies. However, attempts at effective regional planning for the city have been complicated further given the extent of social marginalisation of the urban poor who often have differing cultural perspectives and are seldom fully integrated into the predominantly 'western' lifestyles that govern the political economy of the spatially fragmented city region (Fairclough, 2001; Pieterse, 2008; Escobar, 2010). The area, then, is fertile ground for gaining an understanding of how complex health and environmental problems in a flood-prone, resource-poor city region were, and are, being faced.

Brief outline of the remainder of the study

Following this introductory chapter, Chapter 2 provides a review of literature related to the field of disaster risk, disaster risk policy and management and adaptation, and outlines the position taken by the researcher and the choice of guiding framework for the study. Chapter 3 focuses on the research design for the study and outlines the position taken and the key questions, research aims and objectives and explains the research philosophy and strategy adopted. The chapter moves on to give an account of the research methodology that was used in implementing the study, and the project plan. Note is also made of ethical and quality assurance matters and the risks, consequences and constraints that were managed during the research process, and the positionality of the researcher. To provide some background, Chapter 4 looks at the social, political and environmental context of Gran Resistencia and its hinterland and, more specifically, it highlights the adaptation measures aimed at addressing flooding for the area. Chapter 5 presents the results from the semi-structured interviews with professionals and politicians, highlights key themes that emerged and provides further focus upon interviews that were particularly illustrative of matters related to adaptation to flooding. Chapter 6 follows with a presentation of the results from the

semi-structured interviews with poor flood victims, highlights key themes that emerged and also provides further focus upon interviews that were considered particularly illustrative of salient issues. The following Chapter 7 presents an analysis of the data presented in the previous two results chapters and provides a discussion that relates the data to relevant debates in the development literature. The concluding chapter, Chapter 8, provides a brief summary of each chapter followed by a reflection on the limitations of the research, its certainty and generalisability, the value of the analytical framework and its associated themes/categorisations and lessons learned from the research experience. In addition, it offers potential lessons for policy, practice or future research and a concluding remark asserting the contribution made in answering the central research question.

CHAPTER 2

Literature review

Chapter 2 provides a critical literature review of key debates related to the topic of this thesis and positions the field research in relation to the issues identified. There is a broad range of potentially relevant material and, in maintaining a focus on the aims and objectives of the study, the literature review seeks to provide a brief overview of concepts and terminologies pertinent to the impact of flooding upon the urban poor and associated planning and adaptation measures. In doing so, the chapter notes a marked dichotomy within the literature between technical, physically-oriented perspectives, often adopted by authorities in practice, and more socially-oriented theoretical conceptualisations that give greater recognition to the experiences of the vulnerable poor within a political economy context, though can often be rather academic and abstract. As such, Chapter 2 reflects upon frames of understanding related to urban flood risk, vulnerability, coping, adaptation and resilience and how these impact upon how flooding is addressed. Consideration is given to issues of applicability and representativeness of the differing perspectives and their appropriateness for analysing coping and adaptation to flooding in a city region. The chapter briefly concludes with the identification of more detailed research questions and outlines the choice of a suitable guiding framework for the remainder of the study of the Resistencia city region before Chapter 3 provides greater detail of the research design.

Understanding urban flood risk and adaptation

Undoubtedly, the concept of disaster risk has, along with that of sustainability, become central to international development practice and associated development literature (Adams, 2009; Houghton, 2009; Dessler, 2012; Middleton, 2013). The destruction left in the wake of the Indian Ocean tsunami of 2004, Hurricane Katrina in the US in 2005 and the Great East Japan earthquake in 2011 serve as reminders that the study of disaster risk is relevant to both developed and developing countries alike (Hartman and Squires, 2006; Reed, 2006; Brunsma, Overfelt and Picou, 2007; Sylvester, 2008; Wailoo et al., 2010). In recent years, risk is considered to have changed and become a

much more dynamic prospect, with public perceptions having the potential to vary considerably (Giddens, 2009; UNISDR, 2013a). Alexander (2000, p.10) defines risk as 'the likelihood, or more formally the probability, that a particular level of loss will be sustained by a given series of elements as a result of a given level of hazard impact'. Over half of the growing world population is now considered to be urban and it is clear that extreme weather events, whether due to either natural or manmade causes, have increased in magnitude and frequency; given the increasing number of people and assets in the world, there are huge implications for disaster risk and vulnerability in urban areas (IPCC, 2012).

Throughout human history there has been a gradual development and deepening of understanding of hazard and disaster, with various degrees of mutuality between academia and disaster risk reduction in practice. It has often been the case, however, that risk has been considered too vague, abstract and/or multifaceted a concept to create any impetus for the passing of major legislation until potentially hazardous destructive powers have become a reality. Prior to the drama of the three major events noted above, covered so comprehensively by the media, the study of risk had, though, already begun to take on a centrality within both development literature and the wider economy (Beck, 1992; Bernstein, 1996; Beck, 2009; Giddens, 2009). The complex and multifarious nature of disasters, however, has meant that debate over them is often highly contentious, with various theoretical interpretations having significant influence on the field of study including, for example, a biophysical perspective, a human ecological perspective, a political economy perspective, a constructivist perspective and a political ecology perspective (McLaughlin and Dietz, 2008; Pelling, 2011). In fact, Alexander (2000) considers that the various schools of thought related to disaster come from over thirty different disciplines, though he divides these into three basic categories of: the perception and communication of risk, the estimation of risk, and the management of risk.

The growth in interest in disaster risk within the field of international development in recent years has been accompanied by considerable debate within the literature over the meaning of related terminologies and concepts. Seemingly simple key terms can be viewed in various different ways and/or require further refinement. The term 'hazard', for example, can refer to either a 'natural hazard' such as major flooding, a

'social hazard' such as crowding, or a 'technological hazard' such as the presence of toxic materials. The terms 'disaster', 'risk' and 'hazard', 'vulnerability', 'mitigation' and 'adaptation', are all open to interpretation and much debated. A recurring theme in the literature that is pertinent to this thesis is the oft-quoted distinction between mitigation and adaptation within debates over where the focus ought to lie with respect to tackling the impacts of climate change. The now widely-used categorisations of mitigation and adaptation became established with the environmental treaty known as the United Nations Framework Convention on Climate Change (UNFCCC), which came into force following the Rio 'Earth Summit' of 1992. The term 'mitigation' is in reference to actions to change nature and, more specifically, those that are designed in order to reduce greenhouse gas emissions so that dangerous levels of human interference in the climate system can be prevented (Schipper and Burton, 2009). Indeed, UNFCCC Article 2 defined mitigation as referring to actions that were designed to reduce greenhouse gas emissions for the achievement of 'stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system' (Ibid, 2009, p. 1).

Nowadays, there is increased acceptance that many climate change impacts have been set in train and there has been a growth of scholarship related to adaptation. Adaptation refers to both unconscious and conscious responses to environmental change that can be variously termed coping actions and human adjustments; there is interchangeability in the use of terms since an incidental or purposive adjustment in the short-term can, in the longer term, become incorporated within a cultural adaptation repertoire (Kates, 2009). Schipper and Burton (2009) noted that there is no generally agreed definition for adaptation and, as Pelling (2011) pointed out, even mitigation can be considered a form of 'adaptation'. Furthermore, there is a family of terms related to adaptation used within the field of disaster management including 'coping', 'human adjustment', 'risk management', 'vulnerability reduction', 'resilience' and 'adaptive capacity' and all of these can also be interpreted in different ways (Quarantelli, 1998; Alexander, 2000; Moench, 2009; Schipper and Burton, 2009; Wamsler, 2014). The term 'coping', for example, has been used to define the way in which people direct their actions, within the parameters of expectation and the resources available, for the achievement of various ends (Blaikie et al., 1994). Coping can be considered as proactive problem solving, defence mechanisms, or different ways for handling stress or adaptation.

However, as Ochieng, Juhola and Johnson (2015) note, there has even been a distinction drawn between coping and adaptation within academic literature, with coping seen as more focussed on immediate concerns, that could even undermine future disaster risk reduction measures, whereas adaptation is considered a more future-oriented concept. Furthermore, in recent years, frames of understanding within development literature have shifted to a recognition of change, complexity and uncertainty. As such, there is greater acknowledgement that cities need to be planned and managed in ways that are not only mindful of known risks, such as imminent flooding from heavy rainfall, but also known unknowns, i.e. poorly understood risks, such as the potential regional impacts of flood defences or dam construction upstream. Even 'unknown unknowns', i.e. risks that are, as yet, unanticipated, resulting, perhaps, from the reaching of a climate change 'tipping point', feature within the thinking of some development academics and project managers (Boulton, Allen and Bowman, 2015; Burns and Worsley, 2015; Ramalingam, 2015).

During the earlier years of the United Nations Framework Convention on Climate Change (UNFCC), there was an overwhelming interest in mitigation since stabilisation of concentrations of greenhouse gases was considered of paramount importance. Furthermore, there was often distrust of those favouring greater emphasis on adaptation as it was considered as playing down a need for urgent action, as softening governmental resolve and as favouring the interests of sceptics and those in league with the fossil fuel industry who wanted 'business as usual'. However, to a large degree, in recent years such views have shifted as scientists have more firmly established that climate change is actually occurring (Schipper and Burton, 2009). For Taylor (2015), a key threshold was passed in mid-2013 when the concentration of the greenhouse gas carbon dioxide exceeded 400 parts per million which he considered symbolic of the failure of climate change mitigation.

The failure to reduce emissions has meant that significant manmade changes to global temperatures and to climatic cycles are occurring already, and there is now increased recognition that people across the world will inevitably experience more variability in climate and more frequent weather extremes (Adger, Paavola and Huq, 2006). Consequently, these changes in climate look set to cause significant levels of social distress through, for example, increased pressure on resources, more heat waves,

droughts and water stress, decreases in yields from agriculture and more incidents of major flooding. Changes in climate are often perceived as being incrementally slow if discerned at all; however, as Schipper and Burton (2009) noted, the greater visibility of disaster and heightened perception of more immediate disaster risk have raised public concerns markedly. Since there is now broad consensus that there will be extensive environmental and social impacts because of climate change, there has been a shift in the perspectives of NGOs, national governments and international institutions towards an acceptance of the need for more adaptation measures. Indeed, Article 7 of the UNFCC Paris Agreement fully acknowledges the need for a greater focus on adaptation, vulnerability reduction, strengthening of resilience and capacity building and greater international cooperation and support for poorer regions in their actions for adaptation. In addition, there is an expectation that parties to the agreement have adaptation planning, with periodic updating of an adaptation communication with priorities and details with regard to implementation and further actions, plans and needs (UN, 2018).

Clearly, in undertaking adaptation measures in response to perceived and actual hazards, decisions made over the setting of priorities and determination of how resources are distributed, whether at the international, national, regional or local scale, are inherently political and often contested. The concept of resilience, often framed for adaptation measures, is also contested, with many authors considering that it overlooks power inequalities and that, rather than being a truly transformative goal, merely reflects a drive towards neo-liberal policy. Many authors consider that resilience-thinking is misguided and more system-oriented than human-centred and that it fails to account for different worldviews with respect to human-environment relations; see, for example, Mikulewicz (2019). Whilst there is increased acknowledgement of inequality and vulnerability amongst populations in flood-prone areas within the natural hazard paradigm, Henrique and Tschakert (2019) note that there is limited research looking at the distribution of benefits and losses arising as outcomes from proposed and ongoing adaptation measures, though such research could prove extremely valuable. If, for example, consideration is given to technocratic, physical approaches to adaptation to flooding done through ‘hard’ infrastructural projects such as dams and levees, it can help identify poor use of scarce development funds if it can be shown that there have been inequitable outcomes, a failure to reduce

disaster risk overall or even the heightening of risk overall. There are also issues of justice within procedural matters, since there may be acknowledgement of potential 'winners and losers' at the outset of a project though usually there is little or no assurance that there will be fair or equitable procedures for allocation of funds or prioritisation of adaptation for a particular location or sector (Leichenko and O'Brien, 2006).

It is interesting to note that, following the failure of hard infrastructure in New Orleans during Hurricane Katrina, many planners have sought to incorporate 'soft' solutions into management of city regions through the designation of areas for temporarily accommodating flood waters and through restoration of flood plains to a previous natural role of attenuating flooding (ibid). Historically, in settling near to water bodies, human populations have learned to live with fluctuations in water level, periodic overflowing and land inundation because of the wish to guarantee access to freshwater, fishing and strategic transportation options. However, with increased urbanisation and global population overall, further occupation of flood plains transforms places of periodic flooding into environmentally hazardous locations with the potential of considerable societal disruption. Flooding is now a recurring phenomenon in many city regions across the world and an estimated half of a billion people across the world are affected by a flood each year and, because of the concentration of assets in hazardous areas, disruptions and losses to infrastructure, business and economies in general, are increasing at a startling rate - a point not lost on the insurance market (Swiss Re, 2018). Whether or not public or private insurance schemes are affordable, approximately 2.3 billion people were affected by flood events across the world from 1996 to 2015, with flood events accounting for nearly half of all disasters related to the weather (Henrique and Tschakert, 2019). Flood disasters are exacerbated by deforestation and the pervasiveness of impermeable surfaces and with extreme precipitation looking set to be induced still further by projected climate change, infrastructure networks in many cities are far from adequate. Clearly, better approaches to adaptation need to be sought to deal with the challenges that lie ahead and to try and make the transition towards sustainable development (Black and King, 2009).

Apart from those still in denial of the concept of man-made climate change or those with a fatalistic view that such matters are beyond human capacity to respond effectively, there is broad acceptance of the need for better adaptation measures in the planning and management of flood-prone city regions. Whether the residents of a city region are at risk of sudden, major disastrous flood events, suffer from slow-onset disasters and/or encounter smaller scale yet persistent recurring problems, it is clear that the poorest people are those least likely to be able to deal with environmental challenges (Adger, Paavola and Huq, 2006; O'Donovan, 2008; Dow and Downing, 2011, Pelling, 2011). The challenges of grinding poverty in securing access to sufficient food, water and adequate shelter affect the urban poor on a day-to-day basis. The poor and vulnerable can, of course, be subject to economic or political pressure to migrate to hazardous environments and, once there, climate change can exacerbate the difficulties already faced in securing a sustainable urban livelihood. As noted by The Special Report of the Intergovernmental Panel on Climate Change (SREX), the evidence makes it clear that extreme weather events, whether due to either natural or manmade causes, have increased in magnitude and frequency and, given the increasing number of people and assets in the world, there are huge implications for disaster risk and vulnerability (IPCC, 2012). It is clear, though, that many socio-economic, political and cultural factors have a strong bearing on flood risk and vulnerability and the degree to which people within a city region have the capacity to adapt to flooding and to retain their health and livelihoods (Wisner et al., 2004; Schipper and Burton, 2009; Pelling, 2011). As McLaughlin and Dietz (2008) noted, when consideration is given to vulnerability and adaptation, an integrated perspective ought to be taken on the dynamics that interrelate the environment(s), social structure and human agency.

With such recognition of complexity, there is an apparent need to develop adaptation measures to address flooding that are not only tailored to have concern for immediate threats but that are also responsive to flux and uncertainty and that help in preparing for the unexpected. Given the threats for health and wellbeing from climate change and growth in urbanisation, it is clear that those with responsibilities related to adaptation in flood-prone city regions, be they policymakers, planners or communities themselves, need to be better informed about the potential for future flooding events, more able to identify risks and more cognisant of determining factors. With greater

insight into the risks, causes and impacts of flooding, a variety of stakeholders can be empowered to develop appropriate coping and adaptation measures of various kinds to protect people and assets where and when most needed. Whilst Chambers (2017) cautions that care ought to be taken in drawing overly simplistic binaries within development, and despite the complexity surrounding flood risk, a useful generalised distinction can be drawn to help in appreciating the risks and determining factors associated with flooding for a city region. Within the literature there appears to be a clear dichotomy in the frames of understanding that have a bearing upon the way in which flooding is addressed, i.e. technical perspectives, focused upon physical factors relating to hazard events, and more socially-oriented theoretical conceptualisations that focus more upon political economy with a greater recognition of experiences of the vulnerable poor. Each of these is now considered briefly in turn.

Technical, physically-oriented perspectives

From a technical, physically-oriented perspective, flooding can be seen as a geophysical event having two basic causes, i.e. aspects of climate and the deluge of a developed flood plain (Adams, 2009). A flooding event at a particular urban location can be further attributed to tidal, river or pluvial flooding and/or rises in ground water, the exceeding of the capacity of sewers and the failure of manmade structures such as reservoirs, water mains and pumping stations (Alexander, 2000; R.I.B.A., 2013). Flood risk can be reduced and/or controlled, or the impact of a flooding event limited during the various stages of the 'disaster cycle' of mitigation, preparedness, response and recovery (Alexander, 2000); see Figure 2.1.

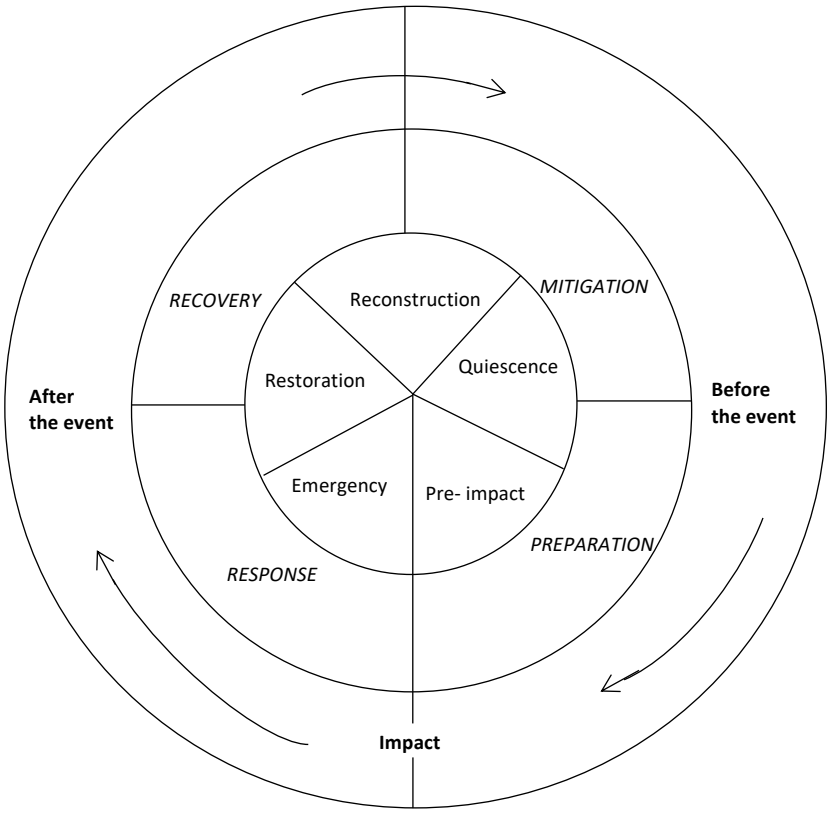

Figure 2.1 The disaster cycle
Source: Alexander, 2000, p. 3

Human nature can be such that once the perception of an immediate threat dissipates, so does a willingness to invest resources and time in risk reduction measures within various systems; however, at whatever part of the development cycle, and however costly and time-consuming preventative measures may seem, appropriate investment can obviously help avert flooding events and/or disasters. As well as individual capacities to cope, and the readiness of humanitarian emergency response systems, attempts could be made to reduce or avoid a hazard altogether. A great deal of time and effort is required to carefully identify potential intervention points for reducing risk at the system level; it is considered of great importance for the protection of both the natural and built environment, public health and valued assets (Moench, 2009; Wamsler, 2014). Nine possible categories of response to risk were identified by the UK Office for Government Commerce (2009), i.e. avoiding the threat, reducing the threat, establishing a fallback position, transferring the threat, accepting the threat, sharing the threat or opportunity, exploiting the opportunity, enhancing the

opportunity and rejecting the opportunity. These various types of response to risk are clarified further in Table 2.1, with the addition of examples to show how they could relate to flooding.

Table 2.1 Possible governmental responses to the risk of flooding

Avoid (threat):	Typically, a change to some aspect of a project so that threat can no longer happen or can no longer have an impact, e.g. change location of a new hospital project so that a flooding impact would not be encountered.
Reduce (threat):	Proactive actions to either reduce probability of an event occurring or reducing the impact should it occur, e.g. flood defence engineering.
Fallback (threat):	Establish a plan for reaction should a flooding event occur, e.g. consultation for evacuation procedures in the event of major flooding.
Transfer (threat):	A third party takes on responsibility for financial impact of flooding event, e.g. the buying of a policy with an insurance company to cover for flooding.
Accept (threat):	Make a conscious and deliberate decision to accept the threat of flooding (whilst continuing to monitor the situation), e.g. decision to build a government office in a flood-prone area for economic reasons.
Share (threat or opportunity):	Agreement to share the costs/benefits that would accrue from a potential flooding event, e.g. contracts between local authorities to share the potential 'pain or gain' from the impacts of a major flooding event.
Exploit (opportunity):	Seizing an opportunity to ensure that opportunity will arise from the threat of a flooding event and that its impacts will be realised, e.g. using a flood warning to enforce building codes for better design of a hospital.
Enhance (opportunity):	Proactive actions to enhance the probability that the threat of a flooding event occurring can have beneficial consequences, e.g. establish community-based health and environmental education projects to promote adaptation to flooding.
Reject (opportunity):	Make a conscious and deliberate decision not to exploit or enhance an opportunity, having discerned that it is more economical not to attempt an opportunity response (though continuing to monitor the situation), e.g. continue with an urban agriculture project as originally planned, despite a revised flood warning.

(Based on Office of Government Commerce, 2009)

Technical measures could be taken at various levels of urban planning and management of a city region, from the monitoring of the threat of flooding to implementation of various engineering projects and planning systems, to management and operation of community resources, to reform at the policy level and evaluation. In

terms of monitoring, enhanced flood forecasting and communication systems could be put in place to warn of forthcoming flooding along with the establishment of accompanying evacuation and relocation procedures in readiness for responding to potential major flooding events. Better management and operation of community resources, such as hospitals and schools, recreation areas and housing projects, can be used to ensure greater preparedness of staff and occupiers. At whatever part of the development cycle, and however costly and time consuming they may seem, appropriate investment in flood prevention measures can obviously help avert flooding disasters, and experience has shown that investments in disaster risk reduction (DRR) pay off in a wide range of situations (Green, 2011; UNISDR, 2015).

At the project and planning level, flood control engineering could be undertaken along with various forms of watershed management in attempts to directly reduce risk. Urban and regional planning may have longer term time horizons than other forms of intervention and different forms of strategic planning may suit certain circumstances and scenarios more than others; however, it can have a significant bearing on the welfare of city populations (Dale, 2004). Land-use regulations and the administration of urban and regional spatial planning systems could be improved to ensure more appropriate allocation, siting and regulation of land for house building, hospitals and schools, for example, and ensuring safe and adequate water supplies and sanitation. Furthermore, legal controls over the particular design and layout of buildings may lead to them being more suitable and/or less likely to have a detrimental impact on the surrounding area if a flooding event were to occur and help in keeping the risk of disaster for a city region at an acceptable level (Black, 1998; Campbell, 1999; Burton, 2009; Davoudi, Crawford and Mehmood, 2009; Howard, 2009; Pizarro, 2009)

City regions can benefit from approaches to sustainable urban development that address flood risk whilst simultaneously providing multifaceted benefits such as reduced pollution, better traffic management and urban environments more conducive to improved public health. For example, climate change mitigation could be achieved through the planning and creation of more ‘salutogenic’ environments with green infrastructure to facilitate healthy lifestyles, and through proactive environmental approaches that provide employment opportunities, such as employing local workforces in the upgrading of slums. Also, strategic efforts could be put into reducing

flood risk whilst simultaneously reducing 'obesogenic' effects in certain environments through, for instance, improving layouts, expanding the range of facilities to reduce the need to travel, improving access to fresh food stores and providing opportunities for exercise; see, for example, studies in relation to the Healthy Cities movement such as Rice and Rasmusson (1992), Davies (1993), Hancock (1993) and Werna et al. (1998).

At the policy level, different strategies could be employed to enhance coping and adaptation and risk reduction for a city region through embedding an orientation towards risk reduction amongst relevant stakeholders. To encourage individuals to take the physical measures needed to be more prepared, the decision could be taken, for example, to introduce financial measures such as insurance and tax inducements (Schipper and Burton, 2009). Five kinds of strategic 'mainstreaming', by which a perspective on risk reduction could be embedded within the practices of organisations, were outlined by Wamsler (2014), i.e. programmatic, organisational, internal, interorganisational and educational mainstreaming. Programmatic mainstreaming refers to modification of programme work within specific sectors with a view to reducing risk or at least minimising the chances that risk would be increased as a result of measures taken within a programme. Organisational mainstreaming involves modification of the work structure, policies, legislation and implementation tools of organisations so that adaptation and risk reduction is firmly embedded within organisational practice. Internal mainstreaming involves modification of the modus operandi of an organisation so that its own levels of risk and impacts encountered are minimised and so that there can be continuous functioning were a flooding event to occur. Interorganisational mainstreaming involves the promotion of cooperation between different organisations and sectors so that there can be harmonised managerial approaches to adaptation and risk reduction and capacity building of the urban actors involved. Finally, educational mainstreaming involves conceptual shifts within specific education for the sectors involved so that there is an acceptance that adaptation and risk reduction is an integral aspect of professional responsibilities and activities. The choices and kind of measures taken by authorities in city regions prone to flooding, then, are not only driven by resource availability, the policy context and decision-making processes, but also on the perspectives on development with respect to risk reduction upon which political priorities are based and the culture both within

and between organisations (Davoudi, Crawford and Mehmood, 2009; Howard, 2009; Wamsler, 2014).

As Munck (2015) noted, the state can be considered as a nexus for the interaction between economics and politics and choices over mode(s) of development. Since there is no generally agreed definition for adaptation, the perspectives of civic authorities warrant particular attention since their decisions and actions could favour some people more than others and could actually contribute to increased flood risk for certain groups within the population. Interestingly, Greenburg and Scanlon (2016) noted that physically-oriented perspectives tended to predominate in the general media. They noted that news coverage of flooding events is often focused on physical aspects of flooding events, such as immediate physical impacts, the damage wrought to assets (both natural and manmade) and the visual drama of flooding, often using narrative constructions that have only a superficial appreciation of the reasons and social implications for the flooding and with definitions that favour the powerful rather than the victims. Wamsler (2014) also noted that authorities with responsibility for the planning and management of cities tend to have physically-oriented perspectives; in fact, it is archetypical for city authorities to have top-down approaches with high level discourse and discussions tending to focus upon physical aspects to reducing risk (Ibid, p.8). As Fairclough (2001) cautioned in his work on discourse analysis, managerial language, such as that used in governmental literature related to risk, can disguise issues of finance and power that would be more readily acknowledged in alternative conceptualisations.

The faith in physically-oriented engineering solutions has, along with a general faith in economic growth, been prominent within western discourse on development theory and practice since WWII. Many have questioned the credibility of formal processes of urban and regional planning and management in recent years, seeing them as overly technocratic, regimented and masculine, with a physical orientation that can foreclose alternative conceptualisations of how civil society could and/or should relate to the environment (Howell and Pearce, 2001; Adams, 2009). Economic, socio-cultural and political/institutional shortcomings and negative feedback loops could be avoided or, at least, reduced in their impact by forms of urban governance that, simultaneously,

address physical/environmental and social aspects to flood risk. However, despite failing to give due consideration to matters of social and environmental justice and actually increasing risk for some, physically-oriented approaches to coping and adaptation can have a linear Newtonian logic that lends itself to the formation of consistent and clear rules, regulations and procedures (Chambers, 2017). So, for now, as Wamsler (2014) noted, the tendency remains widespread for city region authorities to view their responsibilities with regard to flood risk primarily in terms of the implementation of physical measures for adaptation and reducing risk, whilst overlooking social vulnerabilities.

Whilst physical perspectives on flooding may still predominate in informing physically-oriented adaptation measures, in recent years such approaches began to be seen as far too narrowly focussed (Burns and Worsley, 2015; Chambers, 2017). Rather than an apolitical technical exercise, the planning and management of a city region prone to flooding is a form of politics of space involving decisions over scarce resources. Clearly, if financial resources are limited, spending on certain types of measure can mean less funding is available for other measures. Given the variability and uncertainty due to climate change and rapid urbanisation, rigid approaches at the national and regional levels can seem increasingly inappropriate, especially if political and economic systems seriously constrain the options available to communities. Approaches to urban and regional planning, for example, can seem long-winded and inflexible and, in alluding to supposedly apolitical technicalities, city authorities working in 'top-down' processes in city regions can work for the management of flooding in ways that are incompatible with grassroots measures. Despite raising the profile of DRR, even the terminology and seemingly neutral language used in UN pronouncements can overlook issues of wealth and inequality in access to the levers of power. Patronage politics can also be such that processes to supposedly address flooding are controlled by the rich and powerful in ways that prioritise the interests of the rich and powerful. So, critical questions arise with regard to how and why hazardous areas are developed and in regard to the frames of understanding of both those in positions of authority and those occupying flood-prone areas.

Socially-oriented, political economy perspectives and the evolution of the natural hazard paradigm

With the nascent development of disaster sociology from the early twentieth century, rather than major flooding events being seen solely as an 'Act of God' and/or the result of natural or supranatural forces, more attention began to be focused upon human failings that may have played a part (Dombrowsky, 1998). As such, the second notable trend became apparent within the development literature, i.e. the coming to the fore of socially-oriented, political economy perspectives, with an increasing acknowledgement of the multifaceted nature of flooding seen as being the result of complex interactions of both socio-economic and political causes and manmade processes as well as natural ones. Broad social, economic and political theories began to be seen as entirely relevant for explaining structural causes of flooding and limitation of choices with respect to adaptation to it. Whilst invoking a kind of Hippocratic oath for geographers to do good, O'Keefe (2017) stressed the paramount importance of appreciating human relationships to the environment and noted that the natural hazard paradigm was one of the few that had developed within geography. The perspective of this current research project is situated within the natural hazard paradigm, and the evolution of that academic perspective is briefly considered below along with its salient aspects of the epidemiology of disasters.

Prior to the 1940s, flood hazards had normally been seen as natural occurring phenomena, and attempts at addressing them were often undertaken through an 'industrial' mindset, with experts undertaking the dispensing of knowledge and organising of preparedness with a predominantly technocratic focus upon approaches such as hydrological engineering and the building of levees and dams. However, with the inception of the natural hazard paradigm in the 1940s in the work of Gilbert Fowler White, it began to be argued that there could be a reduction in the magnitude and frequency of flood disasters if there was also a better understanding of, and influencing of, the decisions people made with regard to land use (Wisner, 2016). In a second generation of research, within an influential school for geographical studies of natural hazards, White partnered with Robert Kates and Ian Burton to develop arguments further and consolidate the natural hazard paradigm with consideration for multiple

and global hazards and the notion of 'bounded rationality' of actors as they perceive risk and respond to those perceptions.

A further key shift occurred when geographers, rather than having a merely meteorological focus, began to question why some people were more marginal and vulnerable to disasters than others. Key influences in the 1970s and 1980s in this 'sociological turn' in study of disasters within geography included the work of Anders Wijkman and Lloyd Timberlake, Phil O'Keefe, Kenneth Hewitt and Michael Watts (O'Keefe, 2017). Later, in the 1990s, the pressure-release and access models of Blaikie et al. (1994) were widely accepted in seeking to understand how dynamic pressures, such as rapid urbanisation and deforestation, impacted upon the way hazardous events were experienced. Clearly, political economy perspectives can be contested with geographers differing in the degree to which overarching structural root causes for political and economic inequality form part of their analyses; see, for example, criticism of the work of Blaikie et al. (1994) in the work of Middleton and O'Keefe (1998). However, it was clear that, with the rejection of a singular focus upon physical hazards per se or upon perceptions, the 'vulnerability approach' was beginning to reach into mainstream thinking with regard to disasters, with lobbying by certain INGOs and even consideration given to vulnerability by the World Bank. There has also been uptake of the perspective on vulnerability by governments within their policies, principally in Latin America, the Caribbean and the Southeast and South of Asia (Wisner, 2016).

Further notable work within the natural hazard paradigm has focused on social justice and issues of equity in addressing environmental challenges and seeking fair outcomes; see, for example, Dow, Kasperson and Bohn (2006), Adger, Paavola and Huq (2006) and Taylor (2015). In recent years, debate/literature concerned with social injustices within disaster response often cite the case of the devastation wrought in Louisiana at the time of Hurricane Katrina in 2005 and the inequitable actions of the authorities; see, for example, the work of Adams (2013) and Cutter et al. (2014). As Wisner (2016) noted, many authors have put forward models of vulnerability, and work of authors such as Pelling (2011), Wamsler (2014) and O'Brien and O'Keefe (2014) can serve as tools to help unpick the complex challenges for a region and

address its vulnerabilities. The discipline of geography has the potential to consider disasters from a very broad range of perspectives from numerical analyses of immediate physical risk to consideration of chaos theory and complexity to psychological exploration of lived experience and how people make sense of the situations in which they find themselves. The natural hazard paradigm continues to evolve and appears well-equipped to make a significant practical contribution in times of rapid environmental change.

Whilst root causes of climate change and, indeed, poverty, may be transnational or regional, negative impacts from hazardous events occur at particular places and times, and disasters can have adverse effects upon public health. Within the natural hazard paradigm, there has been some contribution to understanding adverse effects upon health through epidemiological assessment focused upon who suffers because of disaster and why. Disaster epidemiology is an amalgamation of numerous fields in order to assess adverse effects upon health in both the short and the long term, to predict consequences from potential future disasters and to plan and implement appropriate responses. Also, approaches that are 'people centred' with a focus upon human security and social differentials can challenge narrow fixed perspectives under neoliberalist policy (Taylor, 2015). Through accurate and timely collection of relevant information for decision makers, disaster epidemiology aims to better inform strategic attempts to mitigate or prevent future disaster and, ultimately, reduce or prevent illness, injury and death that result from disaster.

As the frequency and intensity of flood events increases, human populations will be increasingly affected through threats to livelihoods, damage to property and assets, reductions in food and water security and a greater risk of various diseases. Flooding can lead to greater risk of waterborne diseases such as dysentry, typhoid and cholera. If rainfall within and around city regions is too intense for local topography and drainage systems to cope, the environment can be contaminated and there can be increased risk of diarrhea in crowded areas where there is poor sanitation. Areas of standing water can create breeding grounds for various organisms such as mosquitoes and lead to a greater prevalence of mosquito-borne disease such as yellow fever, dengue and malaria. Flood waters may transport soil loaded with toxins such as organic chemicals or heavy metals to areas that were previously unexposed or lead to

infection such as anthrax. Flooded properties can become damp and in the increased humidity, mold can develop that can contribute to a higher risk of respiratory problems (Dow and Downing, 2011). Flooding can lead to heightened risk of drowning and snakebites and injury through, for example, stepping into holes and/or upon sharp objects such as broken glass. Flooding can disrupt access to work and school, lead to adverse effects from displacement and mental health can also suffer, with increased stress, anxiety, domestic problems and suicide. As well as preparedness and emergency planning, the various risks need to be taken account of within systems of health surveillance (O'Donovan, 2008).

A key aspect of the effects of hazards is their uneven distribution across societies, with negative impacts most likely experienced by those in lower socio-economic positions; climate change and disaster, then, are very much humanitarian matters as well as environmental (ibid). Vulnerable poor often inhabit housing of low quality within areas lacking adequate services and infrastructure and can experience systematic exclusion from official schemes for flood protection. Lacking the financial resources to move away from harm or safeguard homes effectively, vulnerable populations are more likely to experience the impacts of weather extremes and may encounter repeated flooding episodes and, by way of a 'ratchet effect', have their marginalisation compounded still further. The old, the young, undocumented immigrants, females, the disabled, and those who rent can be particularly vulnerable, and weather-related disaster can exacerbate inequalities as the capacity of the vulnerable poor to anticipate and cope with extreme events, and to recover from their impacts, is further diminished (Pelling, 2011). As Wisner (2016, citing Twigg, 2004) notes, layers of vulnerability, complexity and dynamic shifts cannot support sweeping generalisations over vulnerability patterns, however the evidence is growing that there is greater susceptibility to harm and loss, and more difficulty in effecting recovery, amongst those who are marginalised and who lack access to resources.

As a diverse range of opinion began to be valued within the academic literature, simultaneously, there was more open criticism of an over-reliance upon the view of technical 'experts'. The actions and, indeed, inactions of those in authority began to be seen as party to various interweaving social, economic and political determinants of major flooding that, along with environmental factors, could be causing harm to

people and/or damaging assets. So, various determinants began to be studied more holistically from a diverse range of academic perspectives (Alexander, 2000). In recent years, UN policymakers have increasingly stressed that it is essential that DRR not only focusses upon the more technological aspects to adaptation, such as civil engineering and high-technology warning systems or the readiness of designated emergency response teams, but also upon socio-economic aspects of vulnerability and how governmental interventions could address flooding and enhance resilience (Burton, 2009).

From socially-oriented, political economy perspectives, beyond the personal choice of someone to live in a hazardous area, a multiplicity of factors can be seen as having a bearing on the exposure to a geophysical flooding event that a person may experience whilst living in a particular flood-prone region. As well as the potential for local populations, the natural and built environments, and the activities and services that form the local economy being at risk within a flood-prone city region, they could also be playing a part in aiding or abetting risk management. The expansion of industry and the potential impacts of climate change can also serve to further complicate and compound the level of unpredictability and uncertainty with regard to flood risk. Whether due to natural or manmade causes or a combination of both, flash floods are increasingly recognised as a significant problem for cities around the world, with increased vulnerability for the urban poor in respect to such flooding whether they are recent migrants to the city or longer-established residents (Giddens, 2009; Wamsler, 2014). Rapid urbanisation and population growth present significant challenges and flash floods have become increasingly recognised as problems for city regions, especially when water flows have been changed and/or hampered by engineering works, affected by inadequate drainage systems, blocked by waste, compacted earth or concrete. Also, engineered structures such as pumping stations, reservoirs, sewers and water mains can fail or their capacity can be exceeded. In addition, along with macro-economic changes to the rural economy, heavy rainfall and flooding within rural areas can further increase rural to urban migration and, hence, increase the levels of urbanisation overall and increase the numbers of vulnerable urban poor (Wamsler, 2004). Flood risk can be exacerbated with migrants colonising areas where flood waters had previously been absorbed.

As well as direct effects upon physical and mental health from various scales and frequencies of flooding, socially-oriented, political economy perspectives show consideration for impacts on livelihoods and activities and services that form a local economy. Impacts such as cuts in energy and water supplies, problems with sanitation and waste and natural resource management, disruption in transport and telecommunication systems, impacts upon informal as well as formal housing, impacts upon cultural assets and the provision of health services and education can all be viewed in terms that go beyond their physical manifestations. A challenge in seeking to achieve harmony between people and place in socio-ecological terms is that there is a socio-economic aspect to flooding and the way in which negative impacts are distributed amongst the community. Whether the residents of a city region are at risk of sudden, major disastrous flood events, suffer from slow-onset disasters and/or encounter smaller scale yet persistent recurring problems, it is clear that the poorest people are those least likely to be able to deal with environmental challenges (O'Donovan, 2008; Dow and Downing, 2011, Pelling, 2011). The challenges of grinding poverty in securing access to sufficient food, water and adequate shelter affect the urban poor on a day-to-day basis. The poor and vulnerable can, of course, be subject to economic or political pressure to migrate to hazardous environments and, once there, climate change can exacerbate the difficulties already faced in securing a sustainable urban livelihood.

As with any political sphere, there can be 'winners' and 'losers' due to approaches taken to coping and adaptation to flooding. Urban agendas with a technocratic bias towards physical impacts can, for example, prioritise the protection of notable civic buildings and residential areas favoured by the powerful and fail to give due consideration to the welfare of poor people at risk of flooding. Difficult questions over resources can arise since taxpayer funding of measures can be beneficial to some more than others and those measures could even be detrimental to certain people by exacerbating flood impacts for them. Flooding of a city region can be disruptive and costly in both physical and socio-economic terms, with impacts potentially differing greatly in frequency and intensity from one neighbourhood to another with serious implications for health equality.

The risk of flooding can be a major problem for different social groups such as households with low incomes, particularly in developing country contexts (Pelling, 1999). In his assessment of flooding in four wards in Guyana, Pelling conducted neighbourhood infrastructural and socio-economic profiling and, using descriptive and qualitative analyses and a questionnaire, sought perceptions of hazard to flooding, past experiences and the adjustments made (Pelling, 1997a; 1997b). His approach looked at the 'dynamic pressures' affecting neighbourhoods and households and considered vulnerability in terms of access to four key assets, namely: secure housing; adequate health care/education; economic resources; and social resources, i.e. community-based organisations. In considering the availability of the aforementioned assets, it became clear that the poor and marginal within society are those that are most at risk of suffering the impacts of flooding in the short, medium and the long terms.

Flooding can, of course, effect both rich and poor alike, and it can be a matter of personal preference for someone to live in a hazardous area, however the urban poor tend to be subject to economic pressure to live in hazardous, flood-prone locations, and a lack of financial resources can hamper them in their attempts to cope with, and recover from, flooding events (Pelling, 2011). Also, certain particular social groups of urban poor can be more at risk such as the unemployed, the old, the infirm or disabled, those with mental health issues, the young, squatters, those who rent, households headed up by a female, and those disadvantaged due to racism or other cultural prejudices. Even when flooding events seem relatively minor without immediate fatalities or huge infrastructural damage, continuous exposure over time can wear people down, both in terms of their health and their limited livelihood resources; such a 'ratchet effect' upon the capacities to cope can be particularly apparent within regions that are economically marginal (Pelling and Wisner, 2009). Despite the obvious potential for serious public health problems, it is all too easy to overlook seemingly minor flooding events when compared to huge regional floods covered by the international media.

As Margareta Wahlström, the Head of the UN Office for Disaster Risk Reduction, stressed "In any given year over 200 million people could lose their lives or their homes or their jobs because of a disaster event. Extreme weather events are on the rise and so are economic losses which can severely impact public finances and be a major

setback for growth" (UNISDR, 2013c). Mutable social and environmental circumstances can increase the challenges and difficulties for the urban poor as they seek to secure sustainable livelihoods. However, further to this, aspects of political economy can impact significantly upon the degree of control that anyone can actually exert in relation to adaptation to a flood prone environment, such as legal aspects of tenancy, access to levers of influence and power, and engagement in local decision making for environmental management (O'Donovan, 2008; Dow and Downing, 2011; Pelling, 2011). It can be considered, then, that, global economic and political forces, continued rapid urbanisation and the threat of climate change all combine to increase the complexity, mutability and uncertainty of flood risk faced by societies in flood-prone city regions. In securing access to sufficient food, water and adequate shelter, the challenges of grinding poverty affect the urban poor on a day-to-day basis. Adequate accommodation of existing and future migrants, as they seek to establish sustainable livelihoods, is, therefore, a huge challenge for city regions (Hardoy, Mitlin and Satterthwaite, 1999; Satterthwaite et al., 2009). Socially and economically disadvantaged people, then, tend to be more at risk of flooding and usually have fewer opportunities to easily adapt to, or mitigate, the threats posed in times of rapid change or shocks (Caniglia, Frank and Vallée, 2017).

The flipside to risk, often overlooked from narrow technical, physically-oriented perspectives, is the multifaceted concept of vulnerability (McLaughlin and Dietz, 2008). The definition of disaster of the United Nations Office for Disaster Risk Reduction (UNISDR, 2017) sees disaster holistically as: 'A serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts'. An oft-quoted, pseudo-equation usefully serves as a convenient conceptual framework in elucidating that risk is a function of hazard and vulnerability (Wisner et al., 2004). There can be numerous categories and levels of vulnerability, though it can basically be seen as a reflection of the potential for adverse impacts or losses (Alexander, 2000). A simple definition of vulnerability refers to the personal or group characteristics related to the capacity to anticipate, cope, resist or recover from a hazard impact. Vulnerability is affected by various factors working in combination to place the life and livelihood of someone at risk of an identifiable and discrete natural

or societal event. The degree of vulnerability experienced has three aspects, i.e. the exposure to particular stress(es), the sensitivity, and the ability to resist or recover (Wisner et al., 2004; McLaughlin and Dietz, 2008).

Within an era of increasing uncertainty over climate change, 'resilience' has become a prominently used concept in recent years, both within academic and professional fields of international development. Many authors have noted the urgent need for adaptation accompanied by the bolstering of the resilience of the poor to help in addressing the issue of flooding (see, for example: Adger, Paavola and Huq, 2006; Pelling, 2011; Ensor et al., 2015; Wamsler and Blink, 2015; Mayer, 2017). Resilience has been defined by the United Nations from the perspective of disaster risk as 'The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management' (UNISDR, 2017). Moench (2009, p.268) listed the essential, underlying elements related to resilience of livelihoods and adaptive capacity to flooding, which can be summarised as the environmental systems, the knowledge systems, livelihood and economic systems, communication systems, transport systems, financial systems, organisational systems and adapted infrastructure systems. Despite the potential difficulties in relating the elements listed directly to measures to reduce risk, Moench (ibid) stressed their fundamental importance to resilience. Given that the poor and marginal in society, especially in resource-poor regions, are those most at risk of suffering the impacts of disasters such as flooding in the short, medium and long terms, many authors consider that focussing on bolstering the resilience of the poor ought to be a developmental priority (see, for example, Twigg, 2004; Wisner et al., 2004; Pelling, 2011; Wamsler, 2014). When an imbalanced bias towards technocratic approaches to hazard with planning and engineering-led adaptation measures have proved inadequate, the resilience and adaptive capacity of people, and their effectiveness in maintaining and/or enhancing livelihood systems can prove hugely significant when facing up to the risk and/or actual occurrence of flooding (Moench, 2009). As well as the level of exposure and sensitivity to risk, vulnerability and the degree to which lives and livelihoods are affected by flooding is affected by the capabilities people have to avoid

and resist it, and to respond and recover from it (Wisner et al., 2004; McLaughlin and Dietz, 2008).

Accumulated capacities have been critical throughout human history as folk have been forced to adapt to changing environments such as periodic flooding and potential disaster. Variations/inequalities in a city region are not only because of particular geographies, demographics and various structural factors but also because of the beneficial and/or detrimental effects of the coping and adaptation measures that people have made over time. So, the second type of socially-oriented, political economy perspective noted within the literature tends to encourage assessment of flooding and risk in ways that not only consider multifaceted structural determinants and vulnerability but also the resilience and level of adaptive capacity of the urban poor and their agency for attempting to avert or cope with the impacts of flooding. For McLaughlin and Dietz (2008), such a comprehensive and integrated perspective of risk requires consideration of the interrelated dynamics between the environment, social and political structures and personal agency.

Given their lack of financial resources and higher probability of living in a hazardous location, it may appear reasonable to see the poorest residents in a city region as those least likely to have the wherewithal to address major flooding issues. However, as Dalziel (2015) poignantly noted, it could be foolish to consider the vulnerabilities of the poor without also giving due consideration to their strengths. Similarly, O'Brien and O'Keefe (2014, p.147) noted "As we have seen in disaster management, we need to move away from a top-down approach and free ourselves of assumptions, such as 'victims are helpless and need to be helped by professionals'. People need to be part of the solution". In fact, several development theorists have encouraged a more culturally sensitive perspective on development (see, for example, Freire, 1996; Sardar, 1999; Tucker, 1999; Shiva, 2009; Escobar, 2010; Amin, 2011). Indeed, in considering the everyday lives of slum dwellers in developing regions, and in warning against the legitimising of unfair forms of urban governance, Pieterse (2008, p.109) points out that 'a deeper appreciation of cultural identities and dynamics that play out in the lived realities of daily life and symbolic manifestations is a prerequisite for more appropriate urban transformations'.

Clearly, in addition to wider socio-political factors, the capabilities that members of communities have to develop their resilience in the face of environmental threats, such as flooding, are dependent upon their own physical, psychological and emotional qualities. The powers and capacities for achieving sustainable livelihoods have also been described in terms of types of capital. For instance, the UK Department for International Development has identified five types of capital, namely: natural capital; physical capital; social capital; human capital; and financial capital (Bridge et al., 2009). All these types of capital have a relevance to coping with flooding and they can apply to both formal and informal realms of the economy. It is important to note that genuine attempts to address flooding require a greater appreciation of a whole variety of coping strategies. There may be many differing opinions as to what constitutes a healthy and/or secure course of action in order to adapt to flooding. In addition to professional, governmental and/or technocratic perspectives, then, insights into community sociology, behaviour and perspectives on resilience from the grassroots can have great value.

The capacities people have, as they strive to be resilient and healthy and cope with flooding through implementing personal and community-oriented strategies, can also be considered as being partly determined by structural and societal processes and the opportunities available to them. Within development theory, the conceptual contrast is often noted between 'structure' and personal 'agency' with the first term referring to over-arching determinants that limit personal choice and opportunity and the latter referring to functional capabilities of people and their capacity to make their own free choices and act independently. Inadequacies in governmental processes in respect to dealing with flooding can be seen as a structural factor that constrains the poor. Such foreclosing of opportunity has been termed an 'unfreedom' by Nobel prize winning economist Amartya Sen (1999, p.3). The influential work of Sen, carried further by Martha Nussbaum, was encapsulated in what has been termed the 'capabilities approach' (McGillivray, 2008). So, understanding how members of the community adapt to their particular circumstances can be thought of as a two-fold endeavour. On the one hand, it requires, an awareness of the plethora of macro-level, socio-economic and political factors that may enable or constrain the actions of community members and, on the other hand, it requires an awareness of the different strengths, knowledge,

capacities and actions that may derive from individuals and their more organic and informal support networks.

The existent challenges of adaptation and inequalities in exposure to hazard can be exacerbated by the intertwining of complex processes of globalisation and urbanisation with climatic variability and extremes of unprecedented rates and magnitudes (Pearce, 2007; Stern, 2007; Brown, 2008; Burton, 2009; Smit, Burton, Klein and Wandel, 2009). The work of Sen (1999) is particularly salient here in the importance in development he attached to letting personal capabilities flourish. Coping and adaptive capacities can differ greatly within a city region, a particular neighbourhood or even within a household, and this can further exacerbate the variability in impact within mutable, hazardous environments. Within development literature in relation to adaptation, the terms 'adaptive capacity' or 'coping capacity' may be defined as systematic or people-focused abilities with regard to facing up to adverse circumstances, particularly with regard to climate change for the former. The terms tend to be used interchangeably and since approaches are context-specific and incorporate activities that are focused on both the long-term and short-term, differentiation between them is far from clear-cut and could, in fact, be counterproductive (Wamsler and Blink, 2015). As such, the term adaptive capacity is used here in relation to human agency and the abilities of the community to both cope and adapt, their coping efforts could feed into system-wide efforts for reducing risk in both the short-term or long-term. The degree of control that anyone has, and/or wishes to have, over an environment at risk of flooding and the social dynamic within a household can impact upon the sense of control that a person has over their immediate living space and their neighbourhood more widely. The coping strategies and practices of people can be considered the 'visible' expression of their *used adaptive capacity* and consist of both planned and ad hoc endeavours taken before, during and after hazard impacts. Clearly, *unused adaptive capacity* is not expressed into action though it is the latent potential of a person for abilities relevant to coping and adaptation (Wamsler, 2014; Wamsler and Brink, 2015).

Clearly, as well as measures by organisations and systems and the wider community, useful account can be taken of individual capacities for coping and for being resilient, whether used or unused, when assessing the level of flood risk in an area. It would

seem that the coping and adaptive capacities of citizens are essential for the overall coping and adaptation of a city region, and a comprehensive awareness of those capacities and social capital and resilience can help inform more sustainable and pro-poor forms of planning, management and adaptation of flood-prone city regions (Pelling, 2011; IPCC, 2012; Ensor et al., 2015; Wamsler and Blink, 2015). However, the practical implications of the concepts of resilience and adaptation, as with the concept of sustainability, are highly contested. Resilience to perturbation can involve tacit knowledge or implicit knowledge, and psychological and emotional factors, such as a 'sense of place' and attachment, that can play their part in the degree to which ecological and environmental cycles and hazards are considered beyond human control and accepted with an expectation that people have to be personally robust and 'just get on with it'. Moreover, whether or not natural hazards that impinge upon household and livelihoods are seen as an inevitable part of everyday life, a key issue is where the borders and limits of responsibility for addressing such hazards are drawn between individuals and local institutions (Wamsler, 2014). A number of authors are very sceptical of the notion of resilience and the importance it is afforded within international development and many consider that neo-liberalism and its associated global economic and political forces, with a primary focus on capital, economic growth and profit, are chiefly responsible for the obscure and unevenly distributed risks faced by society; see, for example, the work of Beck (1992; 1995), Leys (1996), Nederveen Pieterse (2001), Morvaridi (2008), and Pieterse (2008).

O'Brien and O'Keefe (2014) consider the emphasis on the resilience of individuals or the community as the unfair off-loading of responsibility to the poor due to neo-liberal policies that reduce the role played by the state in securing livelihoods; they cautioned "As current neo-liberal politics generate poverty, building resilience requires overturning the current version of capitalism and political leadership that supports it. Do not allow current political leadership to claim the term resilience when it really means, in their words, 'We are not in this together'" (ibid, p.8). Similarly, Evans and Reid (2014) took the view that preordained international development agendas disempower the poor through seeking adherence to universal environmental narratives that close down their subjective interpretations of how to improve their world(s) on their own terms. Cannon (cited in Wamsler, 2014) also noted that focusing upon the building of capacities through the use of the term resilience, can mean that authorities

overlook the need to address the factors that lead to some people or places being harmed more than others. In his interrogation of the production of knowledge and the practice of adaptation, Taylor (2015, p.77) wryly noted "At times it seems that resilience analysis was curiously written for a pre-capitalist world". In referring to their researching of the concept of resilience for their acclaimed book 'Resilient Life: The Art of Living Dangerously', Evans and Reid (2015, p.154) stated that "Our journey across the resilience terrain forced us to appreciate the hidden depth of its nihilism, the pernicious forms of subjugation it burdens people with, its deceitful emancipatory claims that force people to embrace their servitude as though it were their liberation, and the lack of imagination the resiliently minded possess in terms of transforming the world for the better".

There can, of course, be varying degrees of misdemeanour, veniality or infringement within civic life from short-sightedness and persistent administrative oversight to amoral familism, clientelism and neo-patrimonialism to outright criminality (Howell and Pearce, 2001; Weitz-Shapiro, 2014). Many authors consider that public action to address flooding for city regions is hampered on a more macro-economic scale, with Munck (2018) decrying that no coherent alternative to the neoliberal model of development has, as yet, been fully galvanised. Several authors have recently highlighted how export-focused, extractivist economic approaches within Latin America have led to a range of negative externalities and unequal burdens placed upon vulnerable communities (see, for example, Delgado Wise and Martínez Olivares, 2018; Gudynas, 2018; Wanderley, 2018). Deregulation of corporations, the privatisation of the public realm and the lowering of taxation of corporations and cutbacks to public spending can exacerbate hazardous circumstances. Further to this, the taking advantage of both natural and manmade catastrophes and the undermining of communities and the environment can even be considered a deliberate global strategy of proactive forms of 'disaster capitalism' (Klein, 2007; 2014). Harvey (2014, p. 255) also noted how capital thrives on volatility, and stated that, in addition to the creation of opportunities for business, local environmental disasters "provide a convenient mask to hide capital's own failings: it is that unpredictable, capricious and wilful shrew called 'mother nature' who is to blame for misfortunes that are largely of capital's making". Regardless of the strength of a national or regional economy, the siting of a city region may be such that it is predisposed to suffering the impacts of

hazards such as flooding; environmental conditions may impact greatly upon the degree of security and quality of life experienced by an individual, family or community. However, it is clear that socio-economic and political factors, i.e. the actions or inaction of people, could be pivotal in why severe flooding is experienced and/or is exacerbated. Ideally, city authorities ought to take place-based responsibility for ensuring city regions are sustainable through comprehensively approaching matters related to adaptation and risk reduction in ways that address risk factors, consider both non-physical and physical aspects to the urban fabric and its interrelationships, and build upon awareness of the needs and adaptive capacities of citizens. However, adequate accommodation of existing and future migrants, as they seek to establish sustainable livelihoods can be a huge challenge for city regions within economically poor regions.

Another hotly contested notion within sociological literature is that related to public participation and the influence of grass-roots communities upon development policy and practice (see, for example, Chambers, 1997, 2002, 2005; Tarrow, 1998; Cleaver, 2001; Howell and Pearce, 2001; Nederveen Pieterse, 2001; Kothari and Minogue, 2002; Hall and Midgley, 2004; Greig, Hulme and Turner, 2007; Green, 2008; Rahnema, 2010). It has often been the case that technological, 'masculine' and dogmatic approaches have been taken to regional crises that are financially costly, have low levels of public participation, and that may result in unfair outcomes and the transferring of environmental costs elsewhere (Bahre, 2005; Hasan, 2005; Anand, 2007; Morvaridi, 2008). However, new and/or organic styles of organisational practice can form in response to needs arising from flooding emergencies that exhibit inspiring levels of community resilience (see for example: Sakamato and Yamori, 2009; Johnston et al., 2012). As noted in the introduction, there are various ways in which people may be engaged in civic matters within a city, in various forms of political space and with varying degrees of formality (Cleaver, 2001; Howell and Pearce, 2001; Takano and Nakamura, 2001; Sullivan and Skelcher, 2002; Pieterse, 2008). The simple conceptual ladder of participation of Arnstein (1969, p.217) can help in understanding and evaluating the degree to which citizens influence development policy; see Figure 2.2.

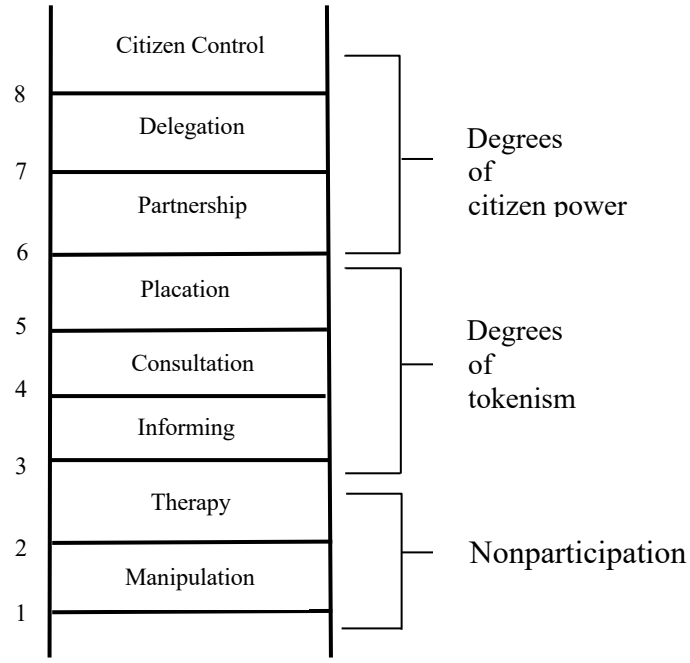

Figure 2.2 Eight rungs on a ladder of citizen participation
Source: Arnstein, 1969

The degree to which a person is able to actively engage in reducing the risk of harm within a flood prone area, and to optimise their chances of leading a healthy, secure life is, indeed, a significant aspect of environmental justice. As Munck (2015) noted, the state can be considered as a nexus between governors and the governed with contestation over the logic over development, with the powerful seeking (hegemonically) to generate consent through its interaction with the general public. However, there is increasing recognition of the implications of environmental, socio-economic and political factors upon capacities in relation to coping and adaptation with regard to flooding. Since the causes of flooding extend beyond the household to the neighbourhood and the city region, the opportunity for meaningful engagement in approaches for adaptation to flooding clearly ought to also extend beyond the immediate vicinity of the vulnerable person in question. Indeed, access to information, the promotion of the inclusion of civil society and the opportunity to participate in decision-making have now been widely acknowledged in the literature as key ingredients for enhanced adaptation of flood-prone city regions (Giddens, 2009; Pelling and Wisner, 2009; Escobar, 2010; Wamsler, 2014; Ensor et al., 2015).

However, whilst participatory processes may seem an obviously pro-poor, humanitarian approach to development, this may not always necessarily be the case. The work of Arnstein (1969), with regard to a ladder of participation, is particularly relevant here in highlighting how participatory approaches to development may be merely tokenistic. Many authors have challenged naïve perspectives on participation and warned of the projection of the values of the powerful and co-option of communities into the agendas of those in control of participatory processes of participation (see, for example: Cleaver, 2001; Howell and Pearce, 2001; Kothari, 2001; Green, 2008; Escobar, 2010; Rahnema, 2010; Esteva and Prakash, 2014). The work of Illich (1978; 2013) is relevant here, too, in its advocacy of 'conviviality' and the 'deschooling of society' - themes that resonate with other post-colonial thinkers who have attempted to deconstruct the meta-narratives of post-WWII development and their coercive stance on political engagement. There has, in fact, been a great deal of contention over the concept of participation with many contributions to the debate over participatory approaches in development having actually come from Latin America. The 'creative Marxism' of Mariátegui in the early twentieth century, for example, pushed for a broad, emancipatory and practical socialism grounded in the day to day living and working practices of marginal social groups and classes (Mariátegui,1928). More famous, perhaps, are the 'bottom-up' perspectives on pedagogy for empowerment of Freire (1996; 2013). More recently, in defying economic neo-liberal orthodoxies, the perspectives of Escobar (2015) and Esteva (2015) imagine ways beyond the perceived impasses in development thinking in arguing for organic, pluralistic and community-oriented forms of 'post-development'. For many years, Latin America has, indeed, been fertile ground for alternative perspectives on international development and, since we do not have 'win-win' interdependency in a post-imperial world, 'a view from the subaltern South' still has considerable value for challenging orthodox theory on globalisation (Munck, 2015, p. xiii).

Clearly, then, in times of increasing uncertainty, those at the grassroots level in a city region can, through their insights on adaptive capacity, social capital and resilience, make a valuable contribution in participating in the development of formal approaches to coping and adaptation to flooding for the area. A label of 'public participation' is

not an instant recipe for success for governmental approaches to flooding; however, genuine forms of participatory planning and engagement could be catalytic in unlocking unused capacities amongst the community to enhance resilience. A key point, then, is whether or not genuine 'political spaces' exist for accommodation of the views of members of the community within participatory approaches to adaptation so that they can shape environmental conditions and respond to risks in meaningful ways that extend beyond the immediate vicinity of the household. If no such political space exists, consideration can be given to what constraints there may be and whether such an absence is contested and/or demands articulated for it. If, on the other hand, such political space does exist, salient considerations are the quality of any associated participatory processes for adaptation and who has control over them. There are also possible constraints to participatory approaches for those wishing to get involved, such as the potential for issues of accessibility in geographical terms, availability in temporal terms or other socio-cultural barriers. So, even if there are genuine attempts to have participatory approaches to environmental management, their representativeness can be called into question (Yates, 2014).

Pieterse (2008) notes the variety of forms of political space within a city within which people may be involved with varying degrees of 'formality'. For example, he notes that there may be a neo-corporatist stakeholder forum in place for the formulation of a City Development Strategy, for example, as well as the more 'traditional' types of representation and mechanisms for participation. Whilst the ladder of Arnstein is undoubtedly helpful, its hierarchical nature may suggest that the maximisation of public participation in formal development policy for addressing flooding would always be the best for the resilience of the poor. In practice, certain situations may not warrant full participation for policy or programmes to be effective, and the poor themselves may consider that the optimum use of their time to cope with flooding would be better spent in other more informal forms of activity rather than engaging in a governmental programme (Dudley, 1993; Laws, Harper and Marcus, 2003). On the other hand, co-ordinated, multi-sectoral forms of collaborative leadership or more organic forms of community organisation can form part of the agency and social capital for ensuring lives in a city region are lived healthily and in a way that is resilient to flooding. Although the degree to which public policy is open to the poor, marginalised and vulnerable and the quality of such participatory opportunities are

very salient considerations, on balance, the promotion of the inclusion of civil society within urban and regional planning in flood-prone city regions appears to be a logical response to increased levels of vulnerability amongst the poor (Pelling and Wisner, 2009; Wamsler, 2014; Ensor et al., 2015; Wamsler and Brink, 2015).

When compared to technical, physically-oriented perspectives, socially-oriented political economy perspectives seem to more pertinently highlight the range of potential causes of flooding and recognise salient issues of finance and power, inequalities in the impacts experienced and the qualities of any opportunities to be involved in formal approaches to risk reduction. However, despite the comprehensiveness of such holistic perspectives on flooding, questions of applicability and representativeness are raised when trying to practically use them in analysing real world settings for the purposes of enhancing coping and adaptation. Choosing a suitable framework for analysing coping and adaptation in a city region, then, is an important step towards enhancing the measures taken; this is considered further in the section below.

Analysing coping and adaptation for a city region in practice

Given the context of a rising world population and the trends towards increased urbanisation as outlined in Chapter 1, a focus on disaster risk for the urban poor is evermore vitally important, and disaster risk reduction (DRR) has become a major policy area for most national governments and for many non-governmental organisations (NGOs). Approximately a third of the global urban population currently lives in informal settlements and slums and, with disaster risk mounting, cash-strapped city regions in the Global South face huge challenges in ensuring adequate housing and basic services for their citizens. With the prospect of an additional global urban population of 2.4 billion over the next thirty years, most of whom are expected to be in the Global South, the United Nations (UN) has stressed there is a pressing need for transformative and integrated approaches for urban governance that both serve to enhance wellbeing and secure more sustainability in urban planning and management (UNEP, 2018). As well as the call for mitigation against climate change and global warming, the recent UN Intergovernmental Panel on Climate Change report has ramped up the pressure on governments around the world to provide greater funding

for adaptation measures, especially since many of the perceived harmful impacts of human activities are considered to be already set in train (IPCC, 2018). The profile of disaster risk reduction (DRR) had been raised further with the endorsement of the United Nations Plan of Action on Disaster Risk Reduction for Resilience (Plan of Action) in April 2013 as a strategy for accelerating the integration of DRR within efforts towards sustainable development and poverty reduction; see Table 2.2.

Table 2.2 The commitments of the United Nations Plan of Action on Disaster Risk Reduction for Resilience

Commitment 1:	Ensure timely, co-ordinated and high quality assistance to all countries where disaster losses pose a threat to people's health and development.
Commitment 2:	Make disaster risk reduction a priority for the UN system and organisations within.
Commitment 3:	Ensure disaster risk reduction for resilience is central to post-2015 development agreements and targets.

Source: UN, 2013d

Guidelines for disaster risk management are now also enshrined in the Sendai Framework for Disaster Risk Reduction 2015-2030 (Sendai Framework) which was adopted at the Third United Nations World Conference on DRR in Japan in March 2015 as the successor to the Hyogo Framework. Four main priorities for action were identified within the Sendai Framework for the years until 2030, as shown in Table 2.3. The UN Sustainable Development Goal No.11 (SDG11): Sustainable Cities and Communities set the target of a substantial increase in the adoption and implementation of integrated plans and policies by cities; the aim being to foster resource efficiency, inclusion, climate change mitigation and adaptation, resilience to disaster and the development and implementation of holistic forms of disaster risk management (DRM) at all levels in alignment with the Sendai Framework (UN, 2018). The Sendai Framework targets aim at reducing the mortality rate and number of people affected by disasters and reducing economic losses and damage to infrastructure and services. In addition, the targets highlight the need for an increase in the number of countries with national and local strategies to reduce risk, an increase in systems for information and assessment in relation to risk, improved availability of accessible multi-systems for early warning and, overall, enhanced international cooperation. Along with the development of complementary indicators, the work of measuring the

Sendai Framework targets is to be undertaken at the global level. As can be seen in Table 2.3, the UN prioritises management of disaster risk, at the various stages of the disaster cycle, based upon knowledge of not only the environment and the characteristics of hazard but also the dimensions of the exposure of people and their vulnerabilities and capacities.

The embedding of coherent, coordinated and nested adaptation measures, from policies and plans, at the national, regional and local level of government, through to implementation, management and operation, is key to helping facilitate sustainable city regions that protect the health and wellbeing of the local population with suitable measures to adapt to flooding (Black, 1998; Campbell, 1999; Burton, 2009; Davoudi, Crawford and Mehmood, 2009; Howard, 2009; Pizarro, 2009; Pelling, 2011; Wamsler, 2014). There are many possible interventions for mitigation and adaptation and reduction of flood risk that can take account of the capacities of individuals and communities to address flooding; indeed, there has been weighty encouragement by UN agencies for a greater degree of collaboration and community engagement in DRR measures, such as adaptation to flooding. However, such encouragement is accompanied by an acknowledgement that there is a lack of data at the local level (Kamp et al., 2003; IPCC, 2012).

Table 2.3 Sendai Framework for Disaster Risk Reduction 2015-2030: 4 priorities for action

Priority 1: Understanding disaster risk: Disaster risk management should be based on an understanding of disaster risk in all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment. Such knowledge can be used for risk assessment, prevention, mitigation, preparedness and response.

Priority 2: Strengthening disaster risk governance to manage disaster risk: Disaster risk governance at the national, regional and global levels is very important for prevention, mitigation, preparedness, response, recovery, and rehabilitation. It fosters collaboration and partnership.

Priority 3: Investing in disaster reduction for resilience: Public and private investment in disaster risk prevention and reduction through structural and non-structural measures are essential to enhance the economic, social, health and cultural resilience of persons, communities, countries and their assets, as well as the environment.

Priority 4: Enhancing disaster preparedness for effective response, and to "Build Back Better" in recovery, rehabilitation and reconstruction. The growth of disaster risk means there is a need to strengthen disaster preparedness for response, to take action in anticipation of events, and to ensure capacities are in place for effective response and recovery at all levels. The recovery, rehabilitation and reconstruction phase is a critical opportunity to build back better, including through integrating disaster risk reduction into development measures.

Source: UNISDR, 2015

It is clear that flood risk needs to be more clearly identified and policymakers, planners and communities better informed about the potential for future flooding events and more empowered so that more appropriate urban policies can be developed, and more appropriate actions taken to prepare and adapt and, ultimately, protect people and assets where most needed. In the face of huge social and economic costs for city regions prone to flooding, enhanced capacity for the coherent planning and the implementation of targeted adaptation measures that reduce, or stem the exacerbation of, flood risk and vulnerability is increasingly being seen as vital, especially in resource-poor regions. There is an urgent need for research from different branches of academia, with a variety of study perspectives, aimed at providing insights into the environmental, socio-political and economic factors that lie behind flood risk and the associated vulnerability (Pelling, 2011; O'Brien and O'Keefe, 2014; Ensor et al., 2015; Wamsler and Blink, 2015). A great deal of further research is required to help in the embedding of more effective, synergistic working relationships between planning and health professionals and the community, and it seems cogently clear that

sound socially-oriented adaptation measures need to be informed by sound socially-oriented contextual data. Building a shared vision hails from the credibility of the data that informs decision making, and a key element of consensus building can be the co-production of knowledge (Ensor, 2011; Chambers, 2017). Given the complexities involved in the flooding of a city region, in order to bolster the resilience of the vulnerable poor, an integrated understanding is needed of the dynamics of the environment, socio-economic and cultural structures and the agency of various stakeholders and how they all interrelate (Twigg, 2004; Wisner et al., 2004; McLaughlin and Dietz, 2008; UNISDR, 2013a). The applicability of frameworks of understanding and the representativeness of the methodologies employed in the collection of data are considered of vital importance, then, to inform the selection and implementation of appropriate adaptation measures.

Questions of applicability

Given the urgent need for enhanced forms of adaptation to flooding, the literature review has considered various theoretical frameworks; however, their applicability to actual analysis of a city region such as Gran Resistencia is challenging and debateable. On the one hand, technical, physically-oriented perspectives can have too narrow a focus and fail to give sufficient weight to social aspects such as vulnerability and the subjective opinions of a variety of stakeholders; as Ensor et al. (2015) noted, in the context of environmental change, decision making can be dominated by elites who control the way in which problems are framed and, in so doing, close down learning opportunities and prevent new pathways to adaptation. On the other hand, despite socially-oriented political economy perspectives having a better appreciation of the many facets of risk and vulnerability and the behaviours, adaptive capacities and opinions of relevant stakeholders, they can be too abstract and vague for applying to analysis of a real-world context. Whilst critical reflection on disaster risk could help inform decision makers in reaching for multiple developmental goals in the context of resource allocation challenges, as Ensor et al. (2015, p.39) remarked, “Infusing resilience thinking with critical considerations such as power and equity remains a work in progress”. If, within the processes for adaptation and risk reduction, there has been a failure to fully acknowledge the unique geography, demographics and

economic root causes of flood risk for a city region, then there is likely to be failure in overcoming inequities in health and social vulnerability.

Two analytical frameworks stand out, however, that could be used in evaluating aspects of coping and adaptation. Firstly, Matyas and Pelling (2015) offered an analytical framework that looked at the scope for transition to more sustainable resilience-promoting forms of governance. They noted that, at a time of change of heightened perception of disaster risk and development of associated international policy, it is vital for consideration of current vulnerabilities with a transparent regard for the potential impacts of policy choices and their inherent trade-offs. The analytical framework they suggested involved evaluation of whether systems and organisations tend towards: i) Maintenance of forms of resilience that promote 'business-as-usual', reinforce existing social, economic and political structures and have an emphasis on protection and/or restoration of existing infrastructure; ii) Facilitation of flexibility and diversification to enable transitional forms of adaptation that more fully accept disaster risk management as a valid part of day-to-day operations; or iii) Critical reappraisal of modus operandi, with scope for reorganisation and shifts in control of assets and information to promote more decentralised/devolved processes to address disaster risk. Any of the three aforementioned tendencies may be considered more suitable for the values of the local stakeholders within a particular context.

The analytical framework based upon the work of Wamsler (2014) and Wamsler and Brink (2015) offered a structured way of analysing existing and suggested coping and adaptation measures that enables consideration of more than just physical aspects of coping and adaptation as well as through various stages before and after a flooding event. Their model considered four categorisations, as follows: i) reduction and avoidance of flooding hazards; ii) reduction of vulnerability to flooding; iii) preparedness for responding to flooding; or iv) preparedness for recovering from flooding. These categories focus on both natural and societal drivers of risk and help in analysing coping and adaptation through the various stages of the disaster cycle shown in Figure 2.1. Each of the categories is sub-divided further into one of five themes, i.e. physical, environmental, socio-cultural, economic and political/institutional aspects of coping or adaptation and can be in reference to actual/existing measures or suggestions. The categories of coping and adaptation can

have a degree of overlap, however they enable an appreciation of the experience for people in both positions of authority and the grassroots. Table 2.4 provides examples of the framework applied with examples for grassroots measures to address flooding for the four different stages of the disaster cycle. More holistic, balanced approaches to risk reduction and adaptation could be achieved for urban planning by addressing characteristic features of the urban fabric and addressing influencing risk factors for the spectrum of objectives of coping and adaptation as recommended by Wamsler (2014, p. 257) and as represented on the right-hand side of Figure 2.3. Also, due attention could be paid within the daily practice of planning to all phases of the aforementioned disaster cycle and the interrelated physical, environmental, socio-cultural, economic and political and institutional features of the urban fabric that are represented on the left-hand side of Figure 2.3. Environmental measures can be taken by authorities, for example, such as 'renaturalisation' of wetlands and rivers and the creation of green areas beyond the city to retain flood waters as well as ensuring there are appropriate forms and practice related to forestry and agriculture. As with other forms of adaptation, measures can be done individualistically, or residents can work together in a communitarian way and, there can be unused capacities amongst the community in relation to environmental aspects to risk reduction. For example, previously unused capacities can be employed in upscaled planting projects and larger forms of urban agriculture. Furthermore, such projects, as well as reducing vulnerability, can have further benefits of improving social cohesion, public health and the ecology of an area (Wamsler, 2014; Wamsler and Brink, 2015). Given the complex nature of flooding and the plethora of influencing factors, gaining an overview of coping and adaptation in a city region can be very challenging; however, the framework based on the work of Wamsler (2014) and Wamsler and Brink (2015) is considered an applicable one to the investigation of the situation in the Resistencia city region.

Table 2.4 Coping and adaptation at the grassroots level to address flooding and enhance resilience: Examples of potential measures taken at the various points in the disaster cycle

Hazard reduction and avoidance activities: Moving permanently to a safer place. Avoiding extension to home in hazardous locations. Construction of fences to prevent children getting close to risky zones. Construction of small levees, dams and embankments to protect the settlement. Landfill/expansion to reduce erosion. Planting (or 'fighting' deforestation) to preserve natural flood protection (in surrounding areas of urban settlements/cities). Moving to risky areas as a livelihood strategy so as to be included in post-disaster assistance.

Vulnerability reduction strategies: Construction of drainage systems, including (illegal) connection of private drains to public systems. Taking up paving stones in yard to enable 'soak away'. Construction of 'soak pits'. Raising doorsills or building water barriers in front of houses. Use of wooden plank flooring to allow water levels to sink faster. Increasing height of houses with plinths or stilts/poles. Increasing inclination, direction or length of roofing. Improving electricity installations by covering cables or raising connections. Increasing height of, or customising, furniture and storage facilities. Replacement of walls with more durable materials. Construction of water outlets in houses for easy outflow of water. Cementing streets to avoid people sinking into the mud. Cleaning waste from slopes and water gutters and avoiding littering. Clearing objects that can block the flow of rivers, such as tyres, mattresses, plastic sheets and branches. Repair of public infrastructure, such as broken wastewater pipes. Construction of floating houses. Permanently closing cellar windows. N.B. There are many other non-flooding specific strategies that can be adopted that are social, economic or institutional measures; for example, income diversification and employment in lower risk areas, improving access to formal assistance and information, creation of reciprocal family networks, creation of social cohesion, solidarity and reciprocal relationships, creation of community based organisations to lobby local and national government and psychological and/or emotional support mechanisms. Other physical measures, include moving vulnerable people to lower risk rooms and use of traditional or indigenous knowledge.

Measures to prepare for response to flooding: Possession of commercial products for flood or rain protection, such as floodgates, sandbags and tarpaulins. Having an available room upstairs or the option to move to an 'extra house' if need be. Storage of objects to allow a temporary increase in height of furniture. Storage of plastic sheets for roof, walls and bed. Removal of belongings to a more secure location. Possession of an electric water pump. Storage of objects to block wastewater pipes to avoid flooding, backflow and/or related contamination. Construction of makeshift barriers in front door. Other physical measures can be the construction of emergency rooms and facilities, exchange of rooms to assist the most vulnerable and construction of outdoor safe places or elevated platforms. N.B. Other non-flooding specific strategies include the creation of family and community support networks, information structures and early warning, preparation for eventual evacuation, such as arrangements for emergency shelter, food and drink supplies, accommodation and transportation of vulnerable relatives, storage and security of home and assets.

Measures to prepare for recovery from flooding: In the main, these types of measure are social, economic and political rather than physical ones. Examples include economic diversification and working longer hours, paying into insurance or saving schemes, creation of linkages with various institutions to access formal assistance, moving to riskier areas to enhance prospects of getting assistance, and creation of social networks to gain access to money, food, labour, opportunities to move in, and psychological and emotional support. Support can also be sought from mental health professionals and spiritual and religious groups. In addition, knowledge can be enhanced such that, should a disaster occur, precautionary measures can be taken such as keeping children away from flood waters, wearing gloves and sturdy shoes during rehabilitation and clean-up, avoiding injury from sharp items and poisonous animals.

(Based on Wamsler, 2014)

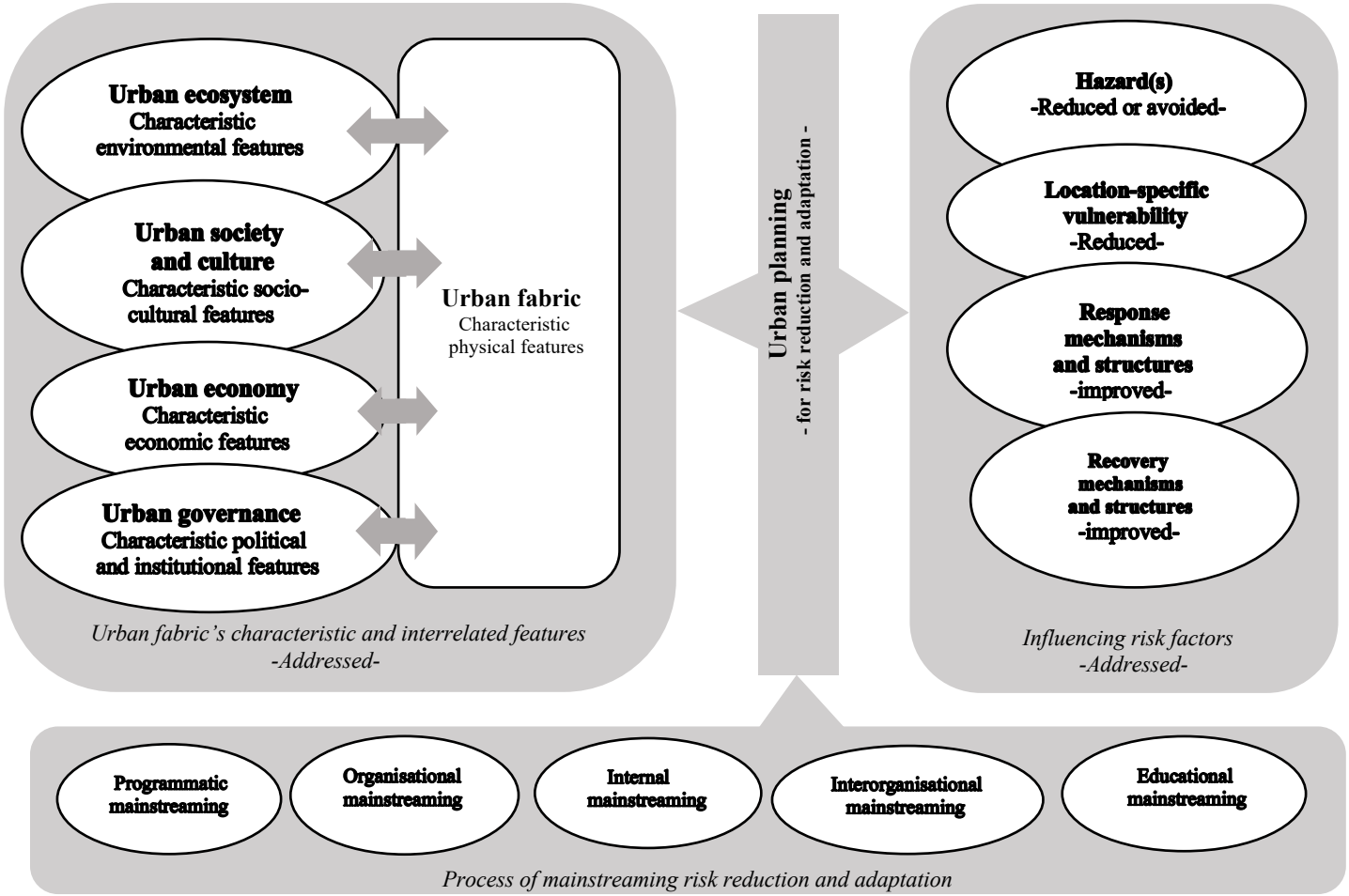

Figure 2.3 Achieving urban planning for risk reduction and adaptation – in theory
Source: Wamsler, 2014, p. 128

Questions of representativeness

If societies across the world are to organise themselves to cope better with flooding, there is an ever greater need to reach appropriate degrees of power subsidiarity, whilst retaining a regional overview (Dovers, 2005). Numerous authors have noted that, from amongst the plethora of potential development interventions, the formulation of more collaborative working practices for urban and regional planning could make a huge contribution to sustainable approaches to flood risk (Black, 1998; Campbell, 1999; Burton, 2009; Davoudi, Crawford and Mehmood, 2009; Howard, 2009; Pizarro, 2009). Along with promotion of the inclusion of civil society as the call for greater public participation becomes mainstream, UN policy increasingly recognises the need for more collaborative and inclusive approaches to DRR. In introducing the United Nations Plan of Action on Disaster Risk Reduction for Resilience in 2013, UN Secretary-General Ban Ki-moon signposted a shift in policy emphasis; he stressed that 'To reduce risks from disasters, we must mobilize a broad coalition of partners, from village chiefs to government ministers, from family-run shops to international corporations, from school principals to hospital directors' (UN, 2013d, p.3). In a sense, in recent years, there has been a convergence of neo-liberal, social democratic and more left-wing political perspectives in acknowledging that sustainable development cannot just be left to governmental politicians and planners (Giddens, 2009).

Several authors consider that if urban policies were based upon greater collaboration of a broad range of stakeholders with various professional insights, with inclusiveness, flexibility and equity in both process and outcome through greater participation of the urban poor with their insights into actual, immediate attempts to cope with flooding, more responsive forms of adaptation could be fostered that also enhance the adaptive capacity of the wider community (see, for example, Black, 1998; Davoudi, Crawford and Mehmood, 2009; Howard, 2009; Pizarro, 2009; Pelling, 2011; Wamsler, 2014; Wamsler and Brink, 2015). Several authors have noted that further insights into how various levels of governance address environmental change in flood-prone areas are both welcome and necessary (Pelling and Wisner, 2009; Wamsler, 2014; Ensor et al., 2015; UNISDR, 2015). It is also clear that a more nuanced understanding is needed of participation in adaptation and flood management; before, during and after disaster

(Cohen and Rai, 2000; Sarlo, 2000; Cleaver, 2001; Howell and Pearce, 2001). Further research is required to help in the embedding of more effective, synergistic working relationships between planning and health professionals and the community. There is a need for more knowhow with regard to reaching consensus over the management of city regions and translating diverse ideas into the realisation and implementation of more equitable and effective flood adaptation measures. Methods of evaluation need to be developed that provide a more explicit acknowledgement of the processes and assumptions involved in the formulation of policy related to flooding and public health, whilst also giving greater recognition for stakeholder participation in more organic forms of adaptation to flooding that may be present in a particular region (Dale, 2004; Dooris, 2005). Likewise, there is a need for more appropriate evaluation of city-wide collaborations and 'co-production' of data in relation to flood risk management. Training and social learning for both individuals and organisations in relation to the skills needed to foster better informed adaptation management could, indeed, be a key aspect of building adaptive capacity and resilience (Kline, 2000; de Leeuw and Skovgaard, 2005; Ensor, 2011; Matyas and Pelling, 2015; Vedeld, Kombe, Msale and Hellevik, 2015; Chambers, 2017).

Numerous authors have stressed the need for a paradigm shift for adaptation based on integrated approaches to participation and collaboration that, in the face of future uncertainties, enable transitional and transformational adaptation for society as a whole (Pelling, 2011; O'Brien and O'Keefe, 2014; Wamsler, 2014; Eriksen, Inderberg, O'Brien and Sygna, 2015; Matyas and Pelling, 2015; Wamsler and Brink, 2015). The terms 'collaboration' and 'participation' are often used interchangeably within development literature. Participation, for the purposes of this thesis, was used above to refer to the involvement of members of the general public in formal processes. Collaboration, on the other hand, is taken here to refer to forms of working partnerships with different kinds of professionals and sectors working cooperatively towards commonly shared goals (Sullivan and Skelcher, 2002). Table 2.5 below helps to show the potential variety of ways in which vulnerability could be addressed by stakeholders based upon different visions people could have of the city region. If, for instance, a focus is placed on economic growth within a city region prone to flooding, a priority could be on protection of infrastructure and physical assets, with such a perspective potentially informed by literature related to insurance and business

continuity, for example (see first row of Table 2.5). If, on the other hand, a city region is viewed as a place providing livelihood opportunities, a government may, for example, prioritise help for vulnerable urban poor through projects and programmes to meet and extend their entitlements and human rights with respect to basic needs.

As Wisner and Pelling (2009) note, there can be a welter of material, historical, situational and cultural processes that could be at work in a city region, and so the table is not exhaustive; a government could, for example, prioritise protection of heritage assets that are valued far beyond their market value. A point to note here though is that, whilst it may be difficult to successfully resolve questions of prioritisation of approaches taken to coping and adaptation for a city region prone to flooding, there is potentially a large variety of visions for a city that could be focused upon addressing the inequities and changeability in the distribution and sharing of environmental risk.

Table 2.5 Linking visions of the city to pathways for managing vulnerability

Vision of the city	*Vulnerable objects*	*Pathways for managing vulnerability*	*Literature*
An engine for economic growth	Physical assets and economic infrastructure	Insurance, business continuity planning	Econometrics of business continuity and insurance
An organism or integrated system linking consumption and production	Critical/life-support infrastructure	Mega-projects connecting urban and rural environmental systems	Political-ecology systems theory
A source of livelihoods	The urban poor, households, livelihood tools	Extending and meeting entitlements to basic needs	Livelihoods analysis and medical sociology
A stock of accumulated assets	Housing and critical/ life-support infrastructure	Safe construction and land-use planning	Political-economy and urban sociology
A political and cultural arena	Political freedoms cultural and intellectual vitality	Inclusive politics and the protection of human rights	Discourse analysis and public administration/ political theory

Source: Pelling and Wisner, 2009, p.9

As Munck (2015) noted, accommodation of counter-hegemonic perspectives on development could help foster social transformation in Latin America. Some of the negative impacts of flooding can be reduced with a greater degree of consensus over the vision for the city rather than an overwhelming level of contestation or wasted effort through work being done at cross-purposes. Since a broad range of political, legal, socio-economic, financial and cultural factors can help or hinder the community, a great disservice could be being done to the urban poor of a city region if full and fair account of social vulnerability and inequalities in adaptive capacity is not taken in designing and implementing coping and adaptation measures, in addition to consideration for future generations (Giddens, 2009). The perspectives of a range of citizens within flood-prone city regions can give very valuable insights and help inform a fuller appreciation of impacts and adaptive capacities. The convergence of perspectives related to international development management, climate change and health presents the opportunity to rethink approaches to regional planning and disaster risk reduction in a less 'mechanistic' way so as to bolster the resilience of communities and lower the prevalence of disease (Shiva, 2008; Cheema, 2009). A variety of stakeholders coming together into collaborations that marry both top-down and grassroots perspectives can avoid the diverting of valuable development resources, and present beneficial opportunities for public health. New and/or organic styles of organisational practice, that exhibit inspiring levels of community resilience in response to needs arising from flooding emergencies have been noted by Sakamato and Yamori (2009) and Johnston et al. (2012), for example. Given the many 'cross-cutting' issues for a city, such as public health, sustainable development and disaster risk reduction, many authors do consider that more holistic and collaborative forms of governance are needed for the comprehensive interventions required.

Both the political left and right have considered collaborations to be beneficial through, for example, partnerships between the public and private sectors and civil society in the provision of public services related to health. However, as noted above, participatory processes can vary in quality and disguise issues of power and finance. However, such efforts raise questions of representativeness (Takano and Nakamura, 2001; Sullivan and Skelcher, 2002). There has been increased focus upon collaboration within management theory and, from a managerial perspective, urban and regional planning and adaptation measures undertaken through collaboratory

processes are often considered as having greater potential to lead to better, more sustainable forms of adaptation that actually work. If viewed from a public health perspective, engagement in a political space for influencing regional approaches to urban and regional planning, management and adaptation, can have the added benefit of enhanced human rights. Also, for those directly involved in influencing policy with relation to adaptation to flooding, their active engagement can provide a number of interlocking opportunities for not only an enhanced sense of preparedness and resilience but also an improved sense of wellbeing and better mental health (Morvaridi, 2008; Linley et al., 2009).

In relation to risk reduction, there has been a significant shift in emphasis of the UN towards encouraging collaboration in risk reduction, as noted above, through SDG 11 and the Sendai Framework; the aim being to help cities become more sustainable, safe, resilient and inclusive through governments and civil society working together (UN, 2017b). Different stakeholders from the level of the individual within the community to various sectors of business and government can all have differing insights into the risks and realities of urban flooding. The political economy of a city region can be a 'melting pot' of ideas and priorities, and although the way in which a society and regional economy are governed can be hotly contested, the plurality of identities, political stances and experiences could all inform attempts to address issues of risk and vulnerability (Munck, 2018). From the stance of authorities, views on systems related to the environment, economy and livelihood, infrastructure, transport, finance, organisation, knowledge and communication could all be considered as underlying, essential insights into aspects of adaptive capacity and resilience with respect to flooding (Moench, 2009). UN agencies have called for a greater degree of collaboration and community engagement in disaster risk reduction measures; however, a number of authors have pointed out the severe lack of relevant data at the local level (see, for example, Kamp et al., 2003; IPCC, 2012). There is a need for greater insight into differing worldviews over what constitutes healthy, secure and/or sustainable courses of action from not just various professional perspectives but also the public even though this can be especially difficult in highly contested political economies and/or resource-poor settings with their implications for social and environmental justice. A comprehensive awareness of the various approaches and practices taken in a city region to cope with flooding ought to involve a clearer

understanding of the phenomenology of adaptive capacity, with a genuine appreciation of both the formal and informal aspects of disaster risk reduction and awareness of the perceptions of politicians, planners and the community themselves (Pelling, 2011). Further research work is needed into grassroots perspectives on flooding and informal coping strategies at the neighbourhood and household level, as well as the sociology of community participation in formal regional planning to address flooding and the evolution of collaborative approaches to adaptation.

As the work of Pelling (2009) and Moench (2009) make clear, it is of great importance to carefully identify appropriate interventions to reduce risk at the system level. Clearly, greater efforts at facilitating collaborative endeavour could optimise the potential of city authorities to successfully mitigate the risks and uncertainties of the future. A greater appreciation of the perspectives and actions of a variety of stakeholders, both in terms of formal and informal approaches, could, in informing policies, plans and projects for disaster risk reduction, enhance the resilience of the poor in flood prone city regions (Pelling, 2011). Better collaborative working practices, then, could help planning for coping and adaptation to flooding in the Resistencia city region to be better informed, more balanced, more responsive to the needs of the vulnerable poor and better equipped to address both current and emerging risks. Figure 2.4 below shows various possible forms of collaboration, and their associated rules for governance, from an organisational perspective, on a spectrum from ad hoc relationships to hierarchical mergers. To appreciate the degree to which approaches towards coping and adaptation in a city region are collaboratory, consideration can be given to the degree to which there has been ‘mainstreaming’ of collaboration within various sectors (Wamsler, 2014). In general, the term ‘mainstreaming’ refers to the modification of core practices through the incorporation of new aspects or topics that need to be taken into account.

Forms of collaboration	Loose network of informal, ad hoc relationships	Limited agreement to share information	Agreement to undertake activities jointly	Agreement to constitute formal governing body	Creation of federal structure in which participating bodies agree to devolve upwards some of their autonomy	Merger of participating bodies into single organisation
Rules of governance	Self-government through mutual norms and obligations and shared values and trust	◄———	———	———►	External government through overarching constitution	Hierarchy
Organisational and policy terminology	Network	Partnership			Federation	Integration

Figure 2.4 Forms of collaboration and rules of governance
Source: Sullivan and Skelcher, 2002

Mainstreaming of collaboration within sectors involved in disaster risk reduction and resilience would involve the co-operation of various stakeholders over a longer time frame, as opposed to short-term 'stand-alone' or 'add-on' programmes, projects or responses that are just solely the day to day work of an implementing body. As such, organisations that have mainstreamed collaboration within their operations have managed to incorporate integrated, cross-cutting approaches that coordinate stakeholders from various sectors to achieve adaptation measures in ways that also serve general, long-term development goals. With risk reduction and collaboration mainstreamed within management and practice, any type of proposed development could be appraised to ensure that it contributes to reductions in the risk of flooding (or, at the very least, ensuring that it would not increase risk still further), whilst also contributing to sectoral goals. Within integrated models of urban adaptation and risk reduction for the governance of city regions, greater collaboration between sectors could, in theory, lead to enhanced approaches becoming institutionalised as standard practice.

The promotion of the inclusion of civil society has the potential to play a key role in enhancing urban and regional planning processes in city regions prone to flooding

(Pelling and Wisner, 2009; LWEC, 2013; Wamsler, 2014; Ensor et al., 2015; Wamsler and Brink, 2015). However, this apparent convergence in calls for greater public participation in policy formation and/or implementation is much contested and could obscure various aims and vested interests. It has often been the case that technological, 'masculine' and dogmatic approaches have been taken to regional crises that are financially costly, have low levels of public participation, and that may result in unfair outcomes and the transferring of environmental costs elsewhere (Bahre, 2005; Hasan, 2005; Anand, 2007; Morvaridi, 2008). The wish for implementation of participatory programmes could also be based on various motives from a belief in the propensity for greater community participation to enhance plan quality to a belief in them having greater social and environmental justice to a belief that public involvement can help reduce financial pressures on state budgets. Also, as well as differing degrees to which people may wish to be engaged in civic matters within a city region, there can be a number of barriers and constraints to cooperative and effective new ways of working. The discourse in formal processes with a city region can be overly bureaucratic and technical (Cleaver, 2001; Howell and Pearce, 2001; Berkeley and Springett, 2006a; 2006b). Psychological, physical and political factors can all conspire to lower access to supposedly participatory processes (Pelling, 1998; Fairclough, 2001; Stern and Green, 2008).

In recent decades within development theory, it has been increasingly accepted that vulnerable poor at the grassroots level could, if they had the opportunity, make valuable contributions to the design of formal approaches to adaptation to the risk of flooding. Unlike 'blueprint' planning, genuine attempts to incorporate grassroots perspectives in urban and regional governance would necessitate 'process-oriented' styles with a great deal of responsiveness, flexibility and/or uncertainty with regard to their outputs (Dale, 2004). However, numerous authors consider that participatory solutions-based approaches, focused upon addressing inequalities with respect to adaptation to flooding, could be transformative and play a key role in overcoming social inequalities more broadly (Wamsler, 2014; Mayer, 2017). In emphasising the need for forms of governance that reduce social risk, O'Brien and O'Keefe (2014, p.188) stated that "Adaptation structure requires both top-down and bottom-up approaches, which may be regarded, respectively, as the deductive and inductive

methods of resilient planning". The case for greater public participation within development initiatives has been persistently argued by several writers (see, for example: Chambers, 1997; Green, 2008). Political processes with regard to the environment may have greater effectiveness when they are a truer reflection of the worldview(s) of local stakeholders and how they envisage the future. The planning and management of a flood-prone city region, then, may be much more responsive when based more upon the opinions of a broad range of local stakeholders and their insights into vulnerabilities and adaptive capacities within their area, as well as the wider regional economic context. However, whilst Munck (2015) noted that the state can be considered as a nexus between governors and the governed, the logic over development is contested and the powerful can seek (hegemonically) to generate consent through its interaction with the general public. The quality of processes for inclusivity, then, are key to the influence that the grassroots can have upon adaptation measures. Along with the extreme differentiation of deprivation within a city, the physical and psychological access to resources and political processes can be dependent on a variety of factors, including cultural ones. High profile programmes and projects designed to facilitate local community participation may, in reality, fail to be truly representative and present the opportunity for local political elites to have a dominant involvement in the political processes (Pelling, 1998; Fairclough, 2001; Stern and Green, 2008). A number of development theorists, however, have encouraged a more culturally sensitive perspective on development (Freire, 1996; Sardar, 1999; Tucker, 1999; Shiva, 2009; Escobar, 2010; Amin, 2011). Indeed, in considering the everyday lives of slum dwellers in developing countries, and in warning against the legitimising of unfair forms of urban governance, Pieterse (2008; p.109) points out that 'a deeper appreciation of cultural identities and dynamics that play out in the lived realities of daily life and symbolic manifestations is a prerequisite for more appropriate urban transformations'. There may be more variegated, flexible and nuanced forms of political terrain to be considered within the everyday development practice that takes place at the grassroots, and there could, of course, also be direct action from the poor and vulnerable communities themselves. Finally, there is also the potential for challenge to, and reconceptualization of politics by "Symbolic contestation through the deconstruction and reconstruction of dominant discourses…" that may challenge accepted 'norms' through the creative use of various media, for instance (Pieterse, 2008, p.102).

Enhanced planning and adaptation for city regions requires insight into power relationships, socio-cultural factors, the degree of transparency involved and the degree to which there are opportunities for the local community and other stakeholders to play a part in shaping adaptation measures. It is clear from the literature review, then, that further research is needed into the sociology of flooding and political economy of adaptation through gaining a more comprehensive awareness of the perceptions of politicians, planners and the community themselves, with a genuine appreciation of both the formal and informal aspects of disaster risk reduction (Pelling, 2011). A closer look is needed at informal coping strategies at the neighbourhood and household levels, and investigation of the opportunities for more fruitful participation of the community in formal regional planning and more effective collaboration amongst a broader range of stakeholders; this needs to be achieved through gathering data from both grassroots and 'top-down' perspectives of those who have direct experience of flooding events.

The guiding framework for the remainder of the study

By way of summary, the literature review noted a dichotomy in how flooding was being conceptualised and this, in turn, impacts upon how the issue is addressed. On the one hand, technical approaches tend to be focussed on physical factors relating to the hazard event rather than issues of vulnerability and social and environmental injustice. On the other hand, there are more academic views on risk and vulnerability that have a much greater emphasis upon the political economy associated with flooding, its determining factors and how it is experienced and addressed. Whilst it became apparent that political economy approaches to flooding were more holistic and balanced in their consideration of salient factors, they were not always applicable to considering the coping and adaptation within a flood-prone city region in practice. So, the literature review moved on to consider what framework would be most applicable for this research, in a sense moving from the abstract to the operational. It became apparent that better, more diverse data in relation to flood risk and adaptation would help decision makers address shortfalls and weaknesses and build upon strengths and capacities. Also, it became clear that consideration of the views of both authorities and the grassroots would improve coping and adaptation for a city region since both groups

could have value in informing planning processes and merited meaningful accommodation within them.

The encouragement by UN agencies for a greater degree of collaboration and community engagement in DRR measures, such as adaptation to flooding, has also been accompanied by an acknowledgement that there is a lack, and/or availability, of data at the local level (Kamp et al., 2003; IPCC, 2012; UNISDR, 2015). As many different socio-economic and political aspects can have a bearing on flood risk, disaster risk management policy can be better informed when data highlights the dynamic interrelationships between the environment(s), social and political structures and human agency (McLaughlin and Dietz, 2008). An integrated perspective, then, that considers the vulnerability and resilience of the community within a city region and identifies the actions taken to address that risk and/or respond to actual flooding events, by both government authorities and the community, can be of great value. Despite the engineering projects around the Resistencia city region, the field research will explore whether local government has failed to satisfactorily address the causes of the frequent ingress of contaminated flood water that has been continually affecting vast numbers of poor people in the area. Flood drains are in existence in some of the city region, however are they adequate to cope with the rainfall? The field research will explore whether there is insufficient disaster risk reduction planning, poor governance and an overall lack of public sector resources in the area, and if widespread vulnerability to flooding persists amongst the urban poor. There are many examples of non-governmental adaptation measures with the region, as well as the governmental approaches; so, in keeping with the spirit and aspirations of the Sendai Framework, it was decided to test a two-fold approach for the purposes of this study.

Firstly, it was decided to split the data collection between two social groupings. It was decided that the views and knowledge of social group outsiders, i.e. professionals and politicians with relevant expertise and experience, would be sought (the etic approach) and then the views and knowledge of social group insiders, i.e. poor flood victims themselves (the emic approach) (Chambers, 2017). Also, it was decided to take the approach recommended by Wamsler and Brink (2015) for analysing the views of the two groups; their framework for analysing coping and adaptation was considered a practical and holistic one as it not only enables consideration of physical aspects of

coping and adaptation but also environmental, socio-cultural, economic and political/institutional aspects too. Furthermore, their model considers the various stages of the disaster cycle from hazard reduction and avoidance to vulnerability reduction to preparedness for recovery and for response.

Governmental responses to flooding in a city region prone to this are clearly influenced by the magnitude of the event or threat, cultural aspects, political will, the capacities of local stakeholders and the resources available. In resource-poor settings, decisions need to be made in balancing expenditure to minimise potential loss in the future through careful identification of points at which interventions can made. Furthermore, the quality of adaptation measures taken depends to a significant degree upon the amount of good quality data available. In times of increasing uncertainty, the research will ask if, as well as those employed by the authorities, those at the grassroots level in the Resistencia city region can, through their insights on adaptive capacity, social capital and resilience, make a valuable contribution in participating in the development of formal approaches to coping and adaptation to flooding for the area. Through careful consideration of the opinions of participants and the qualities of adaptation and resilience in the area, and the adaptive capacities of relevant stakeholders, potential points of intervention to reduce risk at the system level could be more clearly identified. The framework chosen was considered appropriate for highlighting a range of measures/activities for coping and adaptation and a variety of perceptions and suggestions with regard to the qualities and outcomes of such measures and any associated unused capacities. Perceptions of qualities noted could relate, perhaps, to the hazard focus (hazard-specific or multi-hazard), whether a measure is deliberate or unintentional, whether it is pre- or post-flooding and whether associated behaviour is seen as individualistic, communitarian, hierarchical or fatalistic. Perceptions of outcomes could, for instance, be whether measures/approaches are perceived as effective, equitable, flexible and inclusive. Perceptions of unused capacities are noted since professionals and politicians and, indeed, the poor flood victims themselves can draw on and foster beneficial utilisation of them (Ibid, pp. 55-58).

Given the wealth of experience and resilience of the vulnerable poor in dealing with flooding, and their ‘agency’ in optimising livelihood strategies, and even thriving in challenging circumstances, there are many valuable insights that could help inform

more pro-poor forms of sustainable development. There is a greater need for joined-up thinking between social and economic policy, spatial planning, environmental management, health services and the community itself. Such collaboration could help ensure environmental challenges are mitigated, the resilience of the community is enhanced, and a culture of adaptation is mainstreamed within more pro-poor, participatory forms of local development policy, planning and management that reduce the risk of disaster for the city region. A great deal of further research is required to provide a more comprehensive awareness of the perceptions of politicians, planners and the community themselves, with a genuine appreciation of both the formal and informal aspects of disaster risk reduction. A deeper understanding of urban and regional planning processes and the various adaptation measures taken in a city region can help in the development, and embedding of, more synergistic working relationships between planning and health professionals and the community in order to adapt more effectively and equitably to flooding (Pelling, 2011).

This research aims to make a contribution towards such enhanced processes of development through providing insights into the experiences and perspectives of a variety of professionals and members of the community. In the context of the evolving international policy background related to DRR, a focus upon coping and adaptation for Gran Resistencia has the potential to be very informative for gaining an understanding of issues related to disaster risk management for flood-prone city regions with limited resources. It is hoped that insights gained can bolster the capacity of both members of the community and supportive professionals to enhance the resilience and wellbeing of the urban poor. As such, as well as providing a greater awareness of how flooding is dealt with on a day to day basis by the flood victims themselves, despite their limited financial resources, the research aims to identify where there are oversights and discontinuities in thinking and action in relation to development to address flooding and, ultimately, identify where there is potential for fruitful collaborations between policymakers, planners and the community to enhance resilience to flooding and health equity. The data collected from the interviews with professionals and the community and a discussion of the findings form the basis of the chapters that follow. The following Chapter 3 goes into more detail in explaining the design of the research and the methodologies and methods chosen.

CHAPTER 3

Research Design

This chapter outlines the research design for the study into adaptation to flooding in the Resistencia city region, the role of planning and its impact upon the poor. In outlining the position taken, the key questions, research aim and objectives are explained, followed by the research philosophy and strategy that were subsequently adopted. As many different ways could have been chosen to address the research questions, it was important that choices made for the design of this particular research project were reasonable and appropriate for the task (Denscombe, 2007, p. 3). As such, following consultation of experts at the Liverpool School of Tropical Medicine, the researcher chose an appropriate research approach prior to embarking upon the various stages of the project. Chapter 3, then, moves on to give an account of the research methodology that was used in implementing the study, and the project plan. Note is also made of ethical and quality assurance matters and the risks, consequences and constraints that were managed during the research process. Having situated the research project within the literature above, there also follows here further reflection upon how decisions over the research design and methods chosen were informed by the project orientation. The orientation of any research project clearly has a bearing upon which research designs and methods are consequently deemed applicable. As such, the chapter ends with reflection on the personal background and experience of the researcher, why it was considered appropriate to include both top-down and bottom-up discourse within the study and how this was to be achieved. This is accompanied with expression of the positionality of the researcher through the research process and the approaches to data quality assurance that were at play so that a greater degree of transparency is rendered to the qualitative research for the reader (Bryman, 2012).

Key questions, research aims and objectives

The research attempted to reach a greater understanding of how flooding has been and is being dealt with within and around flood defences of the Resistencia city region,

especially in relation to the experiences and impacts upon the poor. The key questions of this research can be articulated as follows:

> ‘How do people in Resistencia city region perceive and adapt to flooding and the risk of further flooding?
>
> ‘What are the perceptions among stakeholders of existing urban and regional planning and adaptation measures to address flooding in the Resistencia city region?
>
> ‘How do stakeholders in the Resistencia city region perceive that urban and regional planning and adaptation measures to address flooding could be enhanced to be more pro-poor?

To help provide answers to the key questions, the research aims were focussed upon:

> Identifying key urban and regional policy, planning and adaptation measures aimed at addressing flooding in city regions in the South;
>
> Identifying the urban and regional policy, plans and adaptation measures aimed at addressing flooding within the Resistencia city region;
>
> Identifying how the poor perceive, experience and adapt to flooding in the Resistencia city region;
>
> Understanding the methods of working between professionals and politicians and the community in the formulation and implementation of urban and regional plans and adaptation measures to address flooding;
>
> Appreciating the opinions of professionals and politicians, and the poor themselves, of how the resilience of the poor could be enhanced through the implementation of amended forms of adaptation within the Resistencia city region.

The more precise research objectives were to:

i) Undertake a systematic literature review related to the topic of adaptation to flooding and issues of vulnerability and resilience;

ii) Describe adaptation measures to address flooding in the Resistencia city region, Argentina;

iii) Explore the perceptions of professionals and politicians in relation to adaptation to flooding in the Resistencia city region;

iv) Explore the perceptions of poor flood victims, both inside and outside of the flood barriers, in relation to adaptation to flooding in the Resistencia city region;

v) Highlight potential lessons for policy, practice or future research.

Research philosophy and strategy

The research philosophy adopted has a bearing upon the perspective taken towards any particular social issue and/or phenomenon under investigation. Given the multiple realities of various stakeholders in the Resistencia city region, concepts related to flooding (and the reduction of the risk of it) are considered as being partially socially constructed. Certain aspects of the ever-changing nature of the city region, both in terms of its environment and the relationship of long-standing residents and recent migrants to it, are seen as negotiated. Conceptualisations of flooding and the approaches taken towards planning can vary widely from policymakers to researchers to the community themselves, especially where there may be different marginalised groups with various 'world-views', such as amongst recent migrants. The *ontology* of a research project refers to the stance taken towards what is considered to be in existence, and whether or not social interactions have an influence upon that reality (Routledge Encyclopaedia of Philosophy, 2000; Bryman, 2012). The theoretical framework used to gain an understanding of urban and regional planning processes in

relation to adaptation to flooding, then, was from an ontological position that was constructivist.

The *epistemology* of a research project is the philosophy behind how perceived social worlds can be studied, i.e. philosophical considerations of what makes for a valid approach and what type of knowledge can be regarded as acceptable to illuminate the discipline in question (Routledge Encyclopaedia of Philosophy, 2000; Bryman, 2012). Many authors have noted the simplified dichotomy within social research between a *positivist* epistemology based upon the application of the principles of natural science, and an *interpretivist* epistemology based upon a phenomenological standpoint that is concerned with how people perceive and interpret their milieu (Denscombe, 2007; Bryman, 2012). However, so that development policies can be informed in ways that target interventions for those at greatest risk, McLaughlin and Dietz (2008) consider the best approaches to researching vulnerability ought to adopt an integrated framework. They stated that:

> 'Specifically, we put forward the concept of a socially constructed adaptive landscape which combines organizational sociologists' insights into structure-environment interactions, constructivists' attention to agency, language and culture as well as critical theorists' concerns with political and economic power, inequality and processes of marginalisation'.
>
> (McLaughlin and Dietz, 2008, p.108).

An integrated approach to the study of vulnerability of flooding, then, was considered able to combine insights into the diverse environmental and political factors that impinge upon the urban poor, along with a greater appreciation of social factors, such as the construction of knowledge from various cultural standpoints and the discourse analysis of regional planning practises (King, Keohane and Verba, 1994; Fairclough, 2001; Barron, 2002). In keeping with the aforementioned suggestion of McLaughlin and Dietz, this research study, then, adopted a critical constructivist realism and epistemology, through which the researcher aimed to provide insights to enable a more 'responsive' form of 'pro poor' regional planning to address flooding in the Resistencia city region. Given the different experiences of flooding between politicians, professionals and the community, the research needed to adopt an approach that helped to identify 'generative causal mechanisms' behind observations

of the social world, i.e. insights into the socio-political and economic factors that lay behind the adaptive capacity of people and their involvement in measures to adapt to flooding (Ensor et al., 2015). As such, in order to achieve the aims and objectives for the thesis that were set out in the section above, the study adopted an approach that employed qualitative methods (Bryman, 2012).

Research methodology

To acquire development knowledge related to the experience of flooding of the vulnerable urban poor of the area, a variety of methodologies could have been used ranging from quantitative/scientific testing and evaluation of geomorphology and weather patterns, for example, to more qualitative forms of social science/anthropology and participatory methodologies. Clearly, there is no one best way of studying the multifaceted nature of flooding and its impacts and any measures taken to address it. In fact, a broad range of research approaches is more likely to be fruitful when studying any particular city region, especially since there is potential for 'bias and blindspots' in any one particular approach (Chambers, 2017, p. 26). As well as the potential for genuine oversights and errors, mechanistic adherence to the perspectives and agendas of those offering financial support, for example, could also have a key bearing on the development of data/knowledge (Ibid, p. 66). Furthermore, the costs and opportunity costs of those involved in research (both researchers and participants) can also be key factors for consideration. So, as well as awareness of the ever-present potential for bias and oversight, and the need for due consideration of epistemological aspects of study of the Resistencia city region, a methodological approach needed to be chosen for this research project that could be of practical worth given the constraints in time and resources (Laws, Harper and Marcus, 2003; Denscombe, 2007; Wallace and Wray, 2011, p.86; Bryman, 2012). As such, in order to provide fresh insights into adaptation to flooding in the Resistencia city region, the research methodology and methods chosen, i.e. the structure and techniques by which the data for the thesis were collected, analysed and presented, had 4 general phases: i) Literature review and refinement of methodology; ii) Semi-structured interviews of key stakeholders, i.e. professionals and politicians (Phase I: Qualitative research); iii) Semi-structured interviews with poor flood victims (Phase II: Qualitative research);

iv) Analysis, discussion of findings and submission of thesis. The chosen research methodology aimed at providing fresh insights to inform development policy, practice and/or research into regional planning related to flooding (Laws, Harper and Marcus, 2003; Denscombe, 2007; Bryman, 2012).

Even though critics could argue that the qualitative approach chosen was imprecise, overly subjective and lacking in generalisability, it was selected for this project as it was considered particularly helpful for gaining a better understanding of the opinions and behaviours of stakeholders at the local level. In striving for scientific rigour and reliability, a quantitative study method could have been costly in time and resources whilst still overlooking potentially key insights due to narrowness and/or rigidity in its design (even if it more readily elicited measurable outcomes for comparison). A qualitative approach using semi-structured interviews was seen as appropriate for a case study of approaches to flood risk in the Resistencia city region since it could serve to inform policy and/or the transformation of urban governance and complement further scientific and/or bigger scale research projects. It was considered that the semi-structured interviews could facilitate identification of the views and priorities of both those responsible for adaptive measures to flooding and those directly affected by it and provide valuable insights about the qualities and outcomes of adaptation measures and the perceptions and consequences of oversight, inaction or malpractice/corruption. Also, it was considered that the qualitative approach particularly lent itself to identifying where potential may lie for enhancement of coping and adaptation for the city region through the use of previously unused capacities. In addition, with the key questions earmarked above having acted as a prompt for the two phases of interview questioning, firstly with professionals and politicians and then poor flood victims, the qualitative approach also fostered an exploration of the apparent divergence between 'top-down' and 'bottom-up/grassroots' perspectives highlighted within the literature review in Chapter 2. Each of the four general phases of the research is briefly elaborated upon below.

Literature review and refinement of methodology

Throughout the early and middle stages of the research project, a systematic, critical literature review into flooding, risk, disaster risk reduction, adaptation and urban and

regional planning was undertaken. In addition, further reading was done into community participation in public policy and collaborative efforts related to adaptation to flooding, as well as into research methods appropriate for the collection of primary data for those fields. A focussed, systematic approach was taken to reading from books, journal articles, 'grey literature', web sites, bibliographic and internet search engines (Wallace and Wray, 2011; Ridley, 2012). As well as conceptually-related reading, background information was also gathered with respect to the history, geography, economy, politics and society in the Resistencia city region. In addition to the more 'conventional' planning material related to disaster risk reduction and regional planning, an extensive review of development literature related to disasters, urban migration, displaced communities and discourse analysis was also undertaken that sought intersections between multi-various aspects of development studies and innovative approaches to the research of them. As such, the reading helped in the development of the methodology employed and informed Chapters 1, 2, 3 and 4 (Ridley, 2012, p. 102).

During the research process, issues for deeper study were identified with the contribution of the PhD supervisors. In addition, so that robust data could be gathered, appropriate sample sizes were confirmed prior to undertaking the semi-structured interviews of the professionals and politicians (Phase I) and poor flood victims (Phase II), so that there is confidence in the findings (Wallace and Wray, p.86). Given the sociological approach that sought to unearth qualitative data on different cultural perspectives on addressing flooding, following scrutiny of insights gained from Phase I, there was slight refinement of the topics for discussion put to the poor flood victims. Phase I and II are considered in more detail below.

Semi-structured interviews of professionals and politicians (Phase I)

An outline of the study was presented at the 6th Conference for Urban Politics, Regional and Environmental Management for Local Development at the University of North East Argentina (UNNE) in Resistencia in 2015. Following this, Professor Carlos Scornik and researcher Valeria Schneider, both of UNNE, helped in the initial identification of professionals and politicians based upon their involvement as authorities in urban and regional planning or approaches taken to address flooding in

four main localities within the metropolitan area, namely Resistencia, Barranqueras, Fontana and Puerto Vilelas. Politicians, water management engineers and town planners are, of course, prime examples of key stakeholders working directly at the nexus of environmental, organisational and infrastructural systems and, therefore, can have a significant bearing upon health and wellbeing in a city region prone to flooding. Their formulation and implementation of various forms of urban and regional planning and adaptation can impact considerably upon communities and their preparations for dealing with flooding. Flood risk and watershed management, flood control engineering, the ensuring of safe and adequate water supplies and sanitation, building codes, urban and regional planning processes and the allocation of appropriate land for building of homes, hospitals and schools are clear examples of areas where decisions over policy have a bearing on adaptive capacity, vulnerability and health outcomes (Black, 1998; Campbell, 1999; Burton, 2009; Davoudi, Crawford and Mehmood, 2009; Howard, 2009; Pizarro, 2009). So, given the history of flooding within the Resistencia city region, and the history of adaptation measures to address it, participants were chosen for interview who were planners and water management engineers identified in various municipal and provincial governmental departments, including the Servicio de Agua y Mantenamiento de Empresa del Estado Provincial (SAMEEP), the Administracion Provincial del Agua (APA), in order to shed light on some of the salient issues in the area and enable a deeper understanding of the 'formal' procedures taken to address flooding and the perceptions of professionals, particularly with regard to the impacts of measures taken upon the more vulnerable.

There are, of course, various ways in which people may be engaged in civic matters within a city region, with varying degrees of formality (Cleaver, 2001; Howell and Pearce, 2001). As well as participation within formal processes for urban and regional planning, there are other aspects to professional life that could, in some regard, have an impact upon the reduction and management of risk (Pelling, 2011). Numerous authors have stressed the need for garnering insights from a variety of opinions from various stakeholders to inform more comprehensive and responsive management of city regions prone to environmental change through a broader appreciation of issues of health, sustainable development, vulnerability and resilience (see, for example: Giddens, 2009; Pelling and Wisner, 2009; LWEC, 2013; Wamsler, 2014; Ensor et al., 2015). Indeed, in introducing the United Nations Plan of Action on Disaster Risk

Reduction for Resilience in 2013, UN Secretary-General Ban Ki-moon signposted a need for more collaborative, inclusive and 'pro-poor' approaches to urban and regional planning with a recognition of the need for mobilisation of a wide coalition of partners (UN, 2013d). So, rather than solely taking on board the views of development professionals, inclusion of a variety of stakeholders in the planning and management of city regions prone to flooding was considered both welcome and necessary. To that end, for the purposes of the Phase 1 data collection, various other types of experienced professionals were also chosen for interview who had experience of coping and adaptation in relation to flooding in their work, so that insights could be collected from a range of standpoints. So, as well as those working directly in infrastructure engineering or planning roles, other kinds of regional water management organisation employees were interviewed, including departmental Heads, a chemical engineer, a research assistant and a lawyer. Other interviewees included the head of a local political party, a number of mayors, a university academic, a number of health workers and social workers and some schoolteachers who worked at schools that served pupils who had experienced flooding. A number of emergency management workers/trainers were also interviewed at their local municipal government offices. All participants had been involved in preparing for flooding and/or dealing with the consequences that flooding had upon people or assets in some capacity within their professional work or their role as a political representative. However, the sample chosen was such that there was a range of experience and so insights could be provided from various levels of governance.

A total of 43 semi-structured interviews were held in Phase 1, of which 21 (48.8%) were male and 22 (51.2%) were female; as such, in regard to gender, there was approximately equal regard for the views of men and women. All of the interviews were conducted in the Resistencia city region within the four main localities of Resistencia, Barranqueras, Fontana and Puerto Vilelas, and their actual occupations were as follows: 10 water management engineers of a regional water management authority (23.3%); 7 politicians (16.3%), 6 teachers/academics (14%); 5 emergency management workers/trainers working with municipal councils (11.6%); 4 planners working within municipal councils (9.3%); 4 health workers (9.3%); 4 social workers (9.3%); 2 national road network workers (4.7%) and 1 lawyer of the regional water management authority (2.3%). The distribution of these, taken as a proportion of the

whole number of Phase 1 interviews (both male and female combined), was as follows: the number of participants based in Resistencia was 28 (65.1%); the number of participants based in Barranqueras was 8 (18.6%); the number of participants based in Fontana was 3 (7.0%); and the number of participants based in Puerto Vilelas was 4 (9.3%). The reason for the data collection being heavily skewed towards those based in Resistencia is two-fold. Firstly, it was a purposeful intention of the researcher to collect more data from Resistencia given that its population is approximately 3 times the size of the other three municipal areas combined. Secondly, as well as having its own municipal government, Resistencia plays a central role within the economy and governance of the region and is home to a number of provincial government offices responsible for works undertaken in all of the four municipalities, such as management of the water and drainage systems, as well as being home to the university. As such, only 7 (16.3%) of the interviews with those based in Resistencia were with people working within the municipal council of Resistencia; the remaining 21 (48.8%), despite being based in the municipal area, worked within roles that had responsibilities for both Resistencia and beyond. N.B. All of those interviewed that were professionals based in the other municipalities, i.e. Barranqueras, Fontana and Puerto Vilelas, worked in roles in which their responsibilities were solely in relation to their particular areas.

Bi-lingual research assistants were appointed and given instruction into good survey practice and the interviews were semi-structured in that participants had flexibility to freely express their views. Attempts were made, however, to guide participants and prompt them, when necessary. To help in this, the bi-lingual assistants were briefed about the research aims and provided with a guide that noted topics for exploration during the interviews. The topics noted in the guide for the semi-structured interviews are shown in Table 3.1. As such, it was made clear that, following more general questions regarding the experience of flooding, insights would be sought on perspectives taken on the impact of policies, plans and measures implemented in respect to flooding. In particular, the research sought to discover what people thought the impact that these policies, plans and measures had had upon the lives of the poor within the city region.

Table 3.1 Semi-structured interview and guide for professionals and politicians

Participant ID: _____
Date: _____

Study Title: Regional Planning to address flooding in Gran Resistencia, Argentina
Researcher: Neil Whittingham

1. Age: 18-30 ☐ 31-43 ☐ 44-56 ☐ 57-69 ☐ 70+ ☐

2. Which of these areas have you had professional or civic responsibility for dealing with a flooding event?
   Resistencia ☐ Barranqueras ☐ Fontana ☐ Puerto Vilelas ☐

3. What was your role when dealing with a flooding event or adaptation measure?
   Politician ☐ Academic ☐ Planner ☐ Housing Officer ☐
   Water Board official / engineer ☐ Capacity building/trainer ☐
   Emergency Manager ☐ Other…. ☐

4. How long ago was the last flood event you dealt with in a professional capacity?
   Up to 6 months ago ☐ Between 6 months and 1 year ago ☐
   Between 1 year and 2 years ago ☐ Between 2 and 4 years ago ☐
   Between 4 and 10 years ago ☐ Over ten years ago ☐

The following topics are a guide and act as prompts in conducting the questioning for the semi-structured interview. As such, there will be a degree of flexibility depending on the responses made:

- Participant's brief recollection of their experience of a flooding event, and the responses made to it by themselves, the community in the area and by government representatives.
- Participant's opinion as to the causes of that flooding.
- Participant's perception of the risk of future flooding.
- Participant's perception of the implications that flooding can have for health.
- Participant's opinion of how best to prepare for any potential future flooding event, and how best to respond to a flooding event if one were to occur
- Participant's perceptions of the regional governmental approaches to planning and adaptation measures, such as how effective do they feel they are in addressing the issue of flooding, their degree of involvement in the political processes behind them, and how they feel they could be improved.
- Participant's view as to whether enough is being done to reduce the vulnerability to flooding of the poor and, if not, what more could be done.

Research strategies can incorporate many forms of community participation (Laws, Harper and Marcus, 2003); the roles played by the research assistants in this research project can be seen in relation to other types of role within a wheel of community participation in research, as shown in Figure 3.1 below. It has been advised that development research ought to be viewed as being either *issue-focused* or *programme-focused* to aid in the choice of methods (ibid); however, this research aimed at being both. The research project provided the opportunity for the researcher to become more cognisant of concepts and issues related to flooding and their implications for planning, whilst also helping to foster joint working and participation in the development research itself. As such, the recruited assistants were encouraged to become actively involved in the management of the research process itself as well as helping in undertaking the fieldwork.

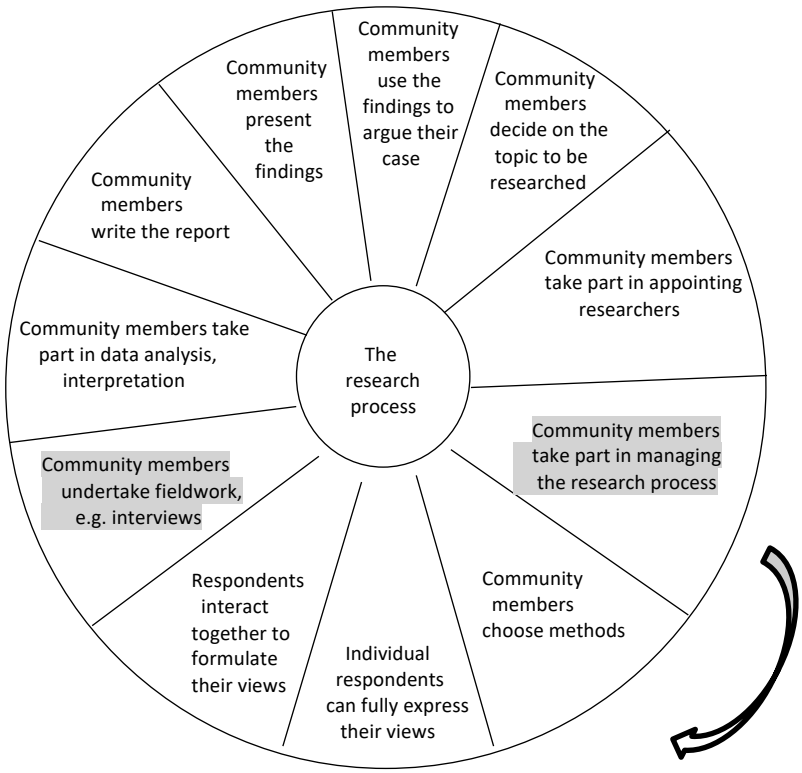

Figure 3.1 The role of research assistants within the research strategy (as located within a wheel of community participation in research)
Source: Laws, Harper and Marcus, 2003, p.62

Having identified suitable participants and research assistant(s), semi-structured interviews were conducted by, initially, presenting the participant with a Spanish translation of background information regarding the research project and copies of the consent form for signing, one for the participant and one for the researcher. Following this, the researcher and assistant conducted the interview using a semi-structured guide for questions (see Table 3.1), whilst making notes both on paper and through the use of a dictaphone. The participant was also presented with a Spanish version of a further document with contact details for further information. The qualitative data collected in Phase 1 were transcribed and checked for accuracy ready for presentation and analysis; the findings are presented in Chapter 5.

Semi-structured interviews of poor flood victims (Phase II)

Semi-structured interviews were conducted to obtain qualitative data from poor flood victims in the four municipal areas of Gran Resistencia, i.e. Resistencia, Barranqueras, Fontana and Puerto Vilelas, as well as Isla Cerrito and Antequeras. The aim was to investigate the issue of flooding as experienced by the community and capture information regarding perceptions of adaptation measures taken by both the community and government, particularly with regard to urban and regional planning and the involvement of the community in adaptation processes. Following the recruiting and training of bi-lingual survey assistants (instructed in good survey practice and health, safety and ethical considerations), care was taken to ensure that participants in the semi-structured interviews were at least 18 years of age, that they were the 'Head of Household' that had experienced flooding, that they self-ascribed as poor and that they had been resident amongst the urban poor within one of the four municipal areas for at least 6 months. Each semi-structured interview within Phase II was recorded using a dictaphone and handwritten notes, and the questioning was conducted using a guide similar to that in Phase I. Also, as in Phase I, all the participants in the semi-structured interviews in Phase II were presented with a Spanish version of background information of the research project and asked to sign two copies of the consent forms. The participants were also given further contact details. Having identified emerging themes from an initial analysis of the qualitative data from Phase I, the format of the semi-structured questions to guide discussion were

amended slightly for use in Phase II; the socio-economic fields and questions related to flooding were made more relevant for the questioning of the community.

The number of males interviewed in the Phase II data collection phase was 25 (51.0%) and the number of females was 24 (49.0%); as such, in regard to gender, the survey was conducted with approximately equal regard for the views of men and women. The Phase II interviews were conducted within the four main municipalities of the metropolitan area of Gran Resistencia (AMGR), along with some neighbouring areas closer to the banks of the River Parana. The distribution of these, taken as a proportion of the whole number of Phase II interviewees (both male and female combined), was as follows: the number of interviewees based in Resistencia was 14 (28.6%); the number of interviewees based in Barranqueras was 12 (24.5%); the number of interviewees based in Fontana was 7 (14.3%); the number of interviewees based in Puerto Vilelas was 3 (6.1%); and the number of interviewees based in the neighbourhoods of Antequeras, Barrio San Pedro Pescador or Isla Cerrito, near to the River Paraná was 13 (26.5%). Given that the municipality of Resistencia has approximately 3 times the population of the other 3 municipalities of Gran Resistencia combined, it was the purposeful intention of the researcher to gather proportionately more data from the municipality of Resistencia compared to the other municipalities. However, almost as many interviews were conducted within Barranqueras and the further neighbouring areas by the River Paraná because these areas experienced extensive flooding during the data collection period. The qualitative data collected in Phase II were transcribed and checked for accuracy ready for presentation and analysis; the findings are presented in Chapter 6.

Analysis and discussion of findings, submission of thesis and dissemination

The collected qualitative data were transcribed and coded by hand, using a variety of coloured pens, to highlight emergent themes. These were then carefully grouped together so that patterns within the data could be identified and a narrative developed. The analysis and discussion can be found in Chapter 7. Following submission of the thesis, it is planned to prepare a PhD report, articles and representations for publication

within respected journals and for dissemination amongst key stakeholders in the Resistencia city region.

Project plan and timeframe

An overview of the research project plan and the timescales for its various phases is provided in the Gantt chart in Table 3.2.

Table 3.2 PhD work plan

Task \ Year	2015	2016	2017	2018	2019
Obtain ethical approval					
Ensure authorisation and legal permits					
Arrange transport, accommodation and vaccinations					
Conduct Phase I: Semi-structured interviews with professionals and politicians					
Conduct Phase II: Semi-structured interviews with poor flood victims					
Collation and analysis of findings					
Completion of write-up					
Submission of thesis					
Examination					
Prepare report for local stakeholders & articles for dissemination					
Graduation					

A logical framework was also considered useful for showing a clear order to the study, and to help in project planning (Potts, 2002; Laws, Harper and Marcus, 2003; Dale, 2004). The aims, objectives and expected outcomes, as identified above, then, are reflected in the logical framework for the research project design as shown in Table 3.3.

Table 3.3. Research Project Design Summary Logical Framework
(Project Title: Adaptation to flooding in the Resistencia city region, Argentina: Planning and its impact on the poor)

Narrative Summary	Objectively Verifiable Indicators (OVIs)	Means of Verification	Important Assumptions/ External Factors
Development goal: i) Contribution towards meeting of UN Millennium Development Goal (MDG) No.7: Ensure Environmental Sustainability; and the Post-2015 UN Development Agenda. ii) Contribution towards meeting goal of building resilience of communities to flooding of the UN Plan of Action for DRR for Resilience, the Hyogo Framework for Action (HFA), Post-2015 Framework on DRR (HFA2) and subsequent approaches.	Improvement in the adaptive capacity of vulnerable poor in the Resistencia city region by 2025; Raised profile of vulnerable poor in urban planning process for the Resistencia city region	Independent evaluation; Independent evaluation.	***Assumptions for achieving:*** Political will Funding
Overall project goal: i) Contribution to theoretical and practical knowledge for policy-making, planning, health service management and the community for the enhancement of the resilience of urban poor in resource-poor city regions prone to flooding; ii) Fostering of enhanced adaptation to flooding for the Resistencia city region.	Dissemination of findings to local government, academics and local community representatives in the Resistencia city region; Recommendations made for effective collaborative approaches between health and planning sector professionals and the community	Acknowledgement of receipt of Post-PhD report from local stakeholders and govt. agencies; Publication in relevant professional and academic literature.	***Assumptions for achieving goal targets:*** Funding
Project purposes: i) Identification of approaches to adaptation to flooding in the Resistencia city region, Argentina and its impact on the poor.	Completion of PhD by Summer 2019	Award of doctorate	***Assumptions for achieving outputs:*** Funding
Outputs/Results: i) A description of planning policy and approaches to address flooding in cities in the South; ii) A description of planning policy and adaptation to address flooding in the Resistencia city region, Argentina; iii) An exploration of perceptions of professionals and politicians of adaptation measures to address flooding in the Resistencia city region and their impact on the urban poor; iv) An exploration of the perceptions of poor flood victims of the Resistencia city region, both inside and outside of the flood barriers, in respect to adaptation measures to address flooding.	Completion of analysis of findings and discussion of issues.	Successful submission of thesis	***Assumptions for achieving outputs:*** Funding
Inputs: i) Literature review of planning policy and adaptation measures to address flooding in city regions prone to flooding; ii) Study of planning policy and adaptation measures to address flooding in the Resistencia city region; iii) Semi-structured interviews of professionals and politicians; iv) Semi-structured interviews of poor flood victims across the Resistencia city region, i.e. Resistencia, Barranqueras, Fontana, Puerto Vilelas, Isla Cerrito and Antequeras.	Completion of literature review; Completion of semi-structured interviews;	Notification of satisfactory progress from LSTM	***Assumptions for providing inputs:*** -Funding; -Political stability; -No major flooding incident at time of study. - Availability of assistants - Sufficient time

N.B. Logic of the project design flows from left to right and from bottom to top as shown by the arrow

(see Potts, 2002; Dale, 2004)

Ethical considerations, quality assurance, risks, consequences and constraints

Professor Carlos Scornik gave written support for the intended Phase I and Phase II surveys and, following LSTM Ethics Committee approval for the study in May 2015, vaccinations and transport arrangements were finalised. Upon arrival in the Resistencia city region, assistant researchers were identified and fully informed of the purpose, method and possible uses intended for the research. The background information and consent form provided to participants informed them of the purpose for the study and the nature of their expected involvement. Attention was drawn to any potential risks and participants were assured that their involvement was entirely voluntary with withdrawal possible at any time. Best practice and health and safety guidelines were followed by researchers and participants, with assurances given that privacy and confidentiality were to be maintained throughout the research process. Participant details were kept private and confidential and interview responses were collected by the researcher at the end of each survey session and kept securely. The main ethical concern had been that counselling services were potentially necessary if a participant in the community survey were to become upset at discussing their experiences in the past or, indeed, in their current circumstances. As such, relevant contact details were provided for Centro Mandela, a local organisation that works for the human rights and mental health of the socially excluded and that provides suitable counselling services (Centro Mandela, 2013). These details were provided to the participant in the further information sheet. Security measures were taken, with community representatives accompanying researchers where considered necessary. Given budget and time constraints, particularly during the primary data collection periods in Argentina, it was important to keep overheads to a minimum, and the challenge of arranging interviews at a time that suited both the participant and the research assistant led to some delay.

Personal background and experience of the researcher

Within qualitative, interpretivist research, there is a risk that the researcher might unduly bias a study and, by letting his or her own views impact too much upon the process of data collection and/or through presenting an inadequate interpretation of

the data gathered, fail to faithfully represent the views of a population. Even if great effort is made to be objective and truly reflect the opinions of participants, it is now widely accepted within the tradition of social constructivist research that qualitative researchers need to be mindful of their own subjectivities and relationships and how these could impact upon the quality of their research (Laws, Harper and Marcus, 2003). As with the positing of the opinions and experiences of interviewees within a socio-cultural context, researchers too ought to provide contextual background of their own lives. If researchers do acknowledge their own standpoints, they can help provide some degree of reassurance that there has been self-reflexivity and conscious effort to achieve transparency and methodological rigour (Cypress, 2017). In deciding how to view the findings, then, it is helpful for readers to know, at the outset, of the personal background and experience of the researcher in this study and his positionality with respect to the population under study.

I am a white, heterosexual, English/Irish man born in 1966 as the youngest of three brothers in South Cheshire in the north west of England. I am from a working-class background of several generations of railway workers in the railway engineering town of Crewe; however, with a sense of wanderlust, rather than follow in the footsteps of my forefathers, I went off to college to study geography and became quite politicised as I learned of some of the social and environmental injustices in the world. I would consider myself to have a socialist outlook, with a particular interest in matters of sustainability and how people relate to their environment. Upon graduating in geography, I began to get involved in community environmental projects such as a scheme for recycling in the voluntary sector in Belfast though returned to England upon receiving some EU funding support to study for a Master's in Civic Design (Town and Regional Planning) at the University of Liverpool. With the Master's completed, I began working in the public sector as a professional town planner and worked as such in Downpatrick, Belfast and Preston, becoming a chartered planner within the Royal Town Planning Institute, an institution of which I am still a member.

My interests from human geography and a belief in active involvement of the community in shaping their environment remained along with a wish to travel, to study further and to be involved in development/disaster risk reduction work overseas. So,

with an eye on both career and personal development, I funded myself through a Master of Arts in International Development Management at Bradford University and sought to focus my reading on issues of sustainability, public participation and public health/the healthy cities movement. The further studies helped to embolden a continued interest in community empowerment within urban planning which has helped inform this thesis. Reading the work of authors such as Paolo Freire, Ivan Illich, Robert Chambers, Amartya Sen and Arturo Escobar, who all questioned the basic tenets of modernist, post-WW2 development, helped to shape my thinking and consequently my approach to this study.

A particular interest in Argentina had begun in 1999 when, as part of my work towards the Master's in Civic Design (Town and Regional Planning) at the University of Liverpool, I received a European Union grant to study in the Resistencia city region for 3 months for a dissertation about housing projects for flood victims. Those three months made an impact upon me, both intellectually and emotionally, and I had maintained contact with some people there, and upon meeting Dr. Tim O'Dempsey at LSTM, we were convinced of the worth of returning to the Resistencia city region to study the impact of flooding upon people further. Following discussion with Tim and Professor Barry Munslow, who were to become my PhD supervisors, a research focus needed to be decided upon that was salient for the city region, achievable, acceptable to the humanitarian aims of LSTM and its procedures with regard to ethical approval, and that built on my career and interests. It became clear that the interests of Tim, Barry and myself cohered around flooding and associated issues of health, sociological/political economy and planning/adaptation.

Ultimately, the ways in which any particular social milieu is viewed is a subjective matter, as are decisions over what study problems are considered worthy of consideration. We considered the experience that people had of flooding as being a matter suitable for an interpretivist research philosophy, i.e. study that acknowledged that experience of flooding was socially constructed and changeable. In terms of epistemology, we felt that knowledge gathered through a two-fold qualitative study would be appropriate that sought to gather views directly from professionals and politicians (top-down) and from the poor flood victims themselves (bottom-up) by

way of semi-structured interviews. Contacts that I had maintained within the planning department of the University of North Eastern Argentina (UNNE) were considered well placed to help me orientate myself and gain access to relevant stakeholders. The approach sat well with me as I was aware of the need for sound professional perspectives on the planning and management of city regions to help make the transition towards sustainable development, and also aware of the perceived value of public participation within international development and town planning policy and parlance. Furthermore, having read some work related to post-structuralist philosophies on development, I not only considered myself as having an empathetic, community-oriented outlook with respect for poor and marginalised flood victims at the grassroots, but also genuinely believed they could better inform approaches to adaptation with their valuable insights. I realised that the legitimacy of the governance of a city region ought not to be taken for granted and that there were many, potentially competing, voices deserving to be heard with respect to flooding.

Positionality of the researcher through the research process and assuring methodological rigour

Following the choices of focus and research strategy to be taken for a study, decisions made at various stages of a study, such as the selection and implementation of research method(s) and decisions over how data is interpreted and presented, all impact upon the findings. So, as well as openness and due consideration of the positionality of the researcher towards the study population noted above, for a qualitative study to have cogency it also needs to have coherence and demonstrate that there has been methodological rigour throughout the research process (Morse, 2015). A study is more convincing, then, if the reader is able to have an appreciation of the positionality of the researcher with respect to how a study was actually undertaken. Such transparency helps reveal to the reader the stages at which the standpoint of the researcher could have had a significant bearing on study outcomes, and helps to show if there has been continual self-reflexivity on the part of the researcher to help avoid undue bias or skewness in the collection or interpretation of the data. Key stages at which decisions were made, i.e. the selection of participants, the conducting of the interviews/choice of style of questioning and the analysis of the data for this study, are considered briefly in turn below.

In regard to the selection of participants for the top-down phase of data selection, I was aware that there can be a tendency of certain professionals to have compartmentalised perspectives in respect to roles and operational responsibilities for city planning and management (Escobar, 2010). My initial contact with associates within the planning department of UNNE, who I had known since 1999, led to me being introduced to contacts within planning departments in the four main administrative areas of Gran Resistencia. Having made initial contacts amongst professionals in municipal planning departments and water management authorities, I wished also to talk to other professionals who were not planners though who were nonetheless associated with the experience of flooding in their working lives in some regard such as through teaching flood victims at school or through involvement in social or health work responses. I also wished, where possible, to meet the mayors of municipal councils. So, initially, I decided to sample purposively to gather insights from urbanists who had been introduced to me through my academic associates in UNNE, though as the top-down phase proceeded along, I also, by way of a snowballing sampling process, identified others who I thought may have valuable perspectives on flooding. The bi-lingual voluntary research assistants were very helpful in this as they lived locally and were able to accompany me to the offices of a range of key stakeholders; in a sense, I had taken on board the spirit of co-generation of data espoused in the work of Escobar (2010) and Chambers (2017) and allowed the participants, to a certain degree, to engage in the management of the research process. Whilst I acknowledge that it would be disingenuous to claim parity of those involved in the research process, especially since research assistants did not engage in the drafting of the initial research proposal, I certainly respected and welcomed input from the assistants as they were students or workers at university or college with an interest in the topic under investigation, knew the locality and had experience of flooding themselves. For the second phase of data collection amongst flood victims, other than the criteria already outlined within the thesis, the approach to selection was more random on a ‘door to door’ basis once a suitable and willing participant had been identified. In both data collection phases, I was mindful of the need to minimise selection bias or, at least, make some sort of partial correction for it (King, Keohane and Verba, 1994). A clear example of a shift in efforts was the recognition that there needed to be more female interviewees for the limited time remaining in Argentina.

However, a fairly equal representation of male to female participants was finally achieved before departing for England.

With regard to qualitative research, there is a risk within the semi-structured interviewing that a researcher could bias a study and fail to give a faithful representation of participant views through either consciously or subconsciously imposing his or her own views upon the data collection process. As Freire (2013) had cautioned, even with good intentions, care needs to be taken not to attempt to speak for the research participants. So, having briefed the research assistants, care was taken not to prejudice the semi-structured interviews by ensuring there was no purposive seeking of alignment of views to those of the researcher or assistants and to ensure there was no use of questions that were too leading. There was, however, a guide to questioning to attempt to steer participants towards making responses that had relevance for the thesis. Care and judgement were exercised then to strike a balance between allowing the participant free reign to express what they wished, having read the statement regarding the purpose of the research and signed the consent form, and keeping the interview focused. Clearly, such skills are learned with experience, though the fact the study was self-funded gave further motivation to keep matters relevant.

With regard to qualitative research of an interpretivist nature, there is also a risk that the interpretation and distillation of the data collected is done in such a way that there is inadequate or unfair representation of participant views. In seeking to do justice to the opinions expressed, this part of the research process extended the overall time taken considerably. With a good grasp of Spanish and the benefit of the facility to pause and replay the digital recordings, all of the interviews were listened to carefully, transcribed and coded over many months. Once points considered salient to the thesis were plucked out, they were grouped and colour coded by hand and analysed in line with the outlined analytical framework relevant to adaptation. The process became a ‘labour of love’, with the twin motivations of enabling incorporation of views not normally included within policy documents and the desire to submit the study for a doctorate qualification keeping me going. Thankfully, the process was eventually completed. I recognise the value of testing for inter-rater reliability, i.e. the coding of the data by someone else in order to see if similar results were obtained (Morse, 2015).

However, given the vast amount of data, the costs would have been prohibitive and so the work was done myself.

CHAPTER 4

Flood measures in context

Chapter 3 briefly looks at the social, political and environmental context of Gran Resistencia and its hinterland and highlights the adaptation measures aimed at addressing flooding for the area. In keeping with the research aims outlined above in Chapter 3, this chapter serves to provide further context for the reader prior to consideration of the results in the later chapters.

Gran Resistencia and its hinterland: an inherently hazardous city region

Geographers can avow to the distinct nature of any particular city region in the world and Gran Resistencia in the Chaco province of north-eastern Argentina is no exception in having its own peculiarities that have impacted upon the relationship of its society to nature and the way in which flooding has been experienced and addressed. Prior to the arrival of the colonial Spanish in the sixteenth century, South America had been populated by many tribes living close to nature, often nomadically. Many indigenous peoples, such as the Guaraní, Toba and Wichí, were already living in the vast geographical region of the Gran Chaco, the lowland plain covering parts of modern-day Bolivia, Paraguay and the parts of northern Argentina within which the Chaco province sits. Originally, there was resistance to new settlers from indigenous people, however the Spanish eventually gained control and proceeded with colonising the area now known as the Chaco province. Following the Great War between 1864 and 1870 between Paraguay and the 'Triple Alliance' of Argentina, the Empire of Brazil and Uruguay, the Argentinian national government began to consolidate its control of the fertile flood plain in the southern and eastern area of the Gran Chaco. With immigration encouraged by the government, an abandoned settlement, that had previously been founded in the mid-18th century by Jesuits as a work mission known as San Fernando del Rio Negro, was re-established as a frontier colony in 1878 and renamed Resistencia. Located near to where the River Paraná is met on its western shore by its tributary, the River Negro, in 1884 Resistencia became the territorial capital of the national territory of Chaco, later becoming the capital of the modern-day

Chaco province. Many of the early European settlers in Chaco were Italians and Germans (Farias de Foulkes, 2002); however, in the late nineteenth century and into the twentieth century, many others from Spain and Eastern Europe made their way across the Atlantic to settle in the area, along with migrants from neighbouring Paraguay. The municipal area of Gran Resistencia is formed of the city of Resistencia, Barranqueras, Fontana and Puerto Vilelas and now has a population of around 400,000 people; see Figure 4.1.

Figure 4.1 Gran Resistencia
Source: OpenStreetMap

There have been various political and economic factors that have had a huge bearing on the people of Chaco and their livelihoods and led to a great deal of uncertainty in the area. At first, of course, there was the immediate impact of colonisation and its socio-political aftermath, with many indigenous peoples, such as the Toba, denied access to the best land and traditional sources of fishing and forced to work for the new settlers. Also, the fluctuating fortunes of the agricultural economy have led to varying degrees of in and out-migration for the Chaco region over the last century. The eastern side of the Gran Chaco had originally been heavily forested before being cleared for farms with cattle ranching, the growing of cotton, the use of the quebracho

tree for tanning and, in more recent years, the cultivation of soy. However, in recent years, the loss of livelihoods from the introduction of technological change and less labour-intensive agricultural practices and price fluctuations, along with national economic crises in general, have led to the Chaco province becoming the poorest in the country. Argentina has suffered from a great deal of political instability and fluctuation in its economic fortunes ever since the 1930s, and the northern eastern province of Chaco has remained one of the poorest parts of the country (Sarlo, 2000; Levy**,** 2015). Chaco is considered, from a macro-economic viewpoint, to have a position within the national and global economy that is peripheral and precarious and, indeed, economic development throughout Latin America has moved in fits and starts for centuries with colonial and post-colonial legacies having plagued economies in the region (Chomsky, 1999; Galeano, 2009; Munck, 2015).

At a more immediate level perhaps, neoliberal policies within recent modern history have had a great impact upon the economy of Chaco and led to considerable under-resourcing of public sector programmes. The capitalist economy has led to the social and economic exclusion of a huge proportion of the population and been a key determinant of their vulnerability to flooding. Many poor people have migrated to the urban Resistencia city region from the countryside in search of better economic fortunes in recent years with many having moved to hazardous informal settlements/slums of which there are two hundred in the urban Resistencia city region holding approximately a third of the local population (Municipalidad de Resistencia, 2006). Life can be very precarious for many as they seek to make a living, with many of the residents of informal settlements involved in fishing; see Photos 4.1, 4.2 and 4.3.

Photo 4.1 Early evening sale of fish, Barrio San Pedro Pescador
Passing motorists can be seen considering purchase of locally caught fresh fish at the side of the highway between the cities of Resistencia and Corrientes. The site is near to the Manuel Belgrano bridge which spans the River Paraná and can be seen in the distance.
Source: Author, 2016

Photo 4.2 Typical catch from the River Paraná for sale, Barrio San Pedro Pescador
Highly-regarded species in the region include the surubí and the dorado.
Source: Author, 2016

Precariousness for many in the area is not just an economic matter however. Whilst the area obviously has good access to fishing from the River Paraná, the next biggest river in South America after the Amazon, and has been very good agricultural land, the area lies in a region of clayey soil where a vast range of geomorphic processes are at work. Human modifications have had marked effects on the natural systems of lagoons, aquifers, underground channels and depressions, leading to unpredictable consequences for drainage for the city region and its hinterland, and major flooding events have been a recurring problem in recent decades for a variety of reasons (Scornik, 1998). The location of the city region means that there is a continual risk of flooding due to: local rainfall, as well as rainfall to the north and west of the region leading to swelling of the River Paraná and the Rio Negro; rises to the water table and the water level in the network of local lagoons; inadequate drainage due to lack of absorption of rainwater by the clayey soil and/or inadequate flood drainage systems. The serious flooding that occurred in Gran Resistencia in 1983, for instance, was only partly attributed to the local clayey soil failing to absorb rainwater. 'El Nino', the cycle of warm current off the coast of Peru, was also considered as a major factor, as well as the reduction in forest cover to the north, in Parana state in southern Brasil (Wijkman and Timberlake, 1985).

Photo 4.3 Fisherman, Barrio San Pedro Pescador
Living close to fishing opportunities at the River Paraná can involve considerable risk of flooding.
Source: Author, 2016

With flooding rising 3m above normal levels, a total of 50,000 low-income households were displaced at that time (Coccato, 1996). Flood risk for the region needs to be related to both natural and manmade causes; social and economic marginality for many residents increases their vulnerability and can be exacerbated by the experience of frequent environmental change and vulnerability in their residential circumstances.

In 1998, extensive flooding affected 40% of Chaco and forced the evacuation of 17,500 residents, the rain having peaked in February at 341mm in comparison to the average of 166mm (IPDUV, 1998). Flooding episodes in 2013 and 2015/2016 highlight the ongoing and increasing nature of the flooding problems for the Resistencia city region. More recently, on the 8th January 2019, flooding occurred again when 224mm of rainfall was recorded in just one 24-hour period, resulting in the displacement of many people; a flood event that came to international attention (see, for example: Al Jazeera, 2019; Floodlist, 2019). There are a variety of health problems experienced by the poor in Chaco, such as tuberculosis, dengue fever, Chaga's disease, leprosy and malnutrition. These health problems have been worsened amongst the vulnerable for many decades by extensive flooding in the region. This is caused by periodic increases in the level of rainfall, combined with poor people being obliged to live in hazardous locations in the many peripheral informal settlements of the Resistencia city region and the nearby lagoons, be they recent migrants or long-standing residents (Franchini and Scornik, 1997; Schweimler, 2007); see Photo 4.4.

Photo 4.4 Houses encircling a lagoon, Resistencia
Many ecologically valuable lagoons, often covered with water hyacinth, are dotted around the Resistencia city region. Living close-by can increase the vulnerability to flooding considerably.
Source: Author, 2016

Periods of intense rainfall often disrupt traffic within Resistencia city centre, and many residents express dismay at the inadequate drainage systems in dealing with the onset of flood waters; see Photos 4.5 and 4.6.

Photo 4.5 City centre flooding
Following heavy rainfall, there is often disruption to the traffic in Resistencia city centre due to flood waters.
Source: Author, 2016

Photo 4.6 Flood victim of Barranqueras
Resident showing photographic evidence of recent flooding at her house**.** Many local people express dismay at the lack of government attention being paid to the frequent flooding of streets and houses.
Source: Author, 2016

Flooding events place further stresses on the health of local residents through waterborne disease, respiratory and skin conditions and snake bites, for instance, and the social and psychological implications of disruption and displacement experienced. Many vulnerable residents living in areas of informal housing prone to flooding also live without adequate sanitation; only around half of the residents of the municipal area as a whole have sewage systems and many live without adequate waste management services (Municipalidad de Resistencia, 2006). As urbanisation moves on apace, insanitary conditions are an immediate threat to public health and to the ecologically valuable watercourses and lakes/lagoons that have become increasingly polluted in recent years (Alcorn, Zarzycki and de la Cruz, 2010). Furthermore, the lack of drainage systems and adequate sewage treatment has generated a fear that further widespread flooding could lead to widespread disease amongst the entire population of the area. Moreover, the extent of social marginalisation of the urban poor and their often different cultural perspectives has meant that they are seldom fully integrated into the predominantly 'western' lifestyles that govern the political economy of the spatially fragmented city region (Fairclough, 2001; Pieterse, 2008; Escobar, 2010).

Adaptation to flood risk in the city region of Gran Resistencia

Gran Resistencia is noteworthy in that resources and governmental adaptation efforts for the region have, for a number of decades, had a two-fold focus of a programme of rehabilitation and an engineered system of embankments and accompanying pumping stations. The former has been orchestrated through a variety of ad-hoc housing projects of varying quality for the relocation of people to areas supposedly away from the threat of further flooding. The defence system, on the other hand, is a World Bank funded, engineered polder system of barriers, with pumping stations at Barranqueras and Laguna Blanca, with a design based on the Swedish fligt system. It has been built and operated by technical staff from the Administracion Provincial del Agua (APA) with a primary focus on protection of the city from the major flooding from the river Paraná. The defence system has kept certain areas of the Resistencia city region in a state of readiness for further riverine flooding since the 1990s; see Photo 4.7.

Photo 4.7 Flood gates at the pumping station at Barranqueras
Control of water levels aims to help reduce the risk of flooding to residents within the city defences of the Resistencia city region.
Source: Author, 2015

By and large, the defences have been portrayed by many to be successful forms of adaptation to flooding and, furthermore, their construction and maintenance, along with the housing projects, have been considered significant employment opportunities for the impoverished local economy (Jefatura de Gabriete de Ministros, 1998). A map showing the location of the defences and pumping station within the Resistencia city region is shown in Figure 4.2. Along with the maintenance and management of the defence system, APA has responsibility for the preparation of risk zoning maps to serve as guidelines for control of development. Firstly, there is a zone map to indicate where development ought to be controlled or prohibited in respect to the threat of raised levels of the rivers; see Figure 4.3. Secondly, there is a zone map to indicate where development ought to be controlled or prohibited in respect to the threat of rainfall; see Figure 4.4

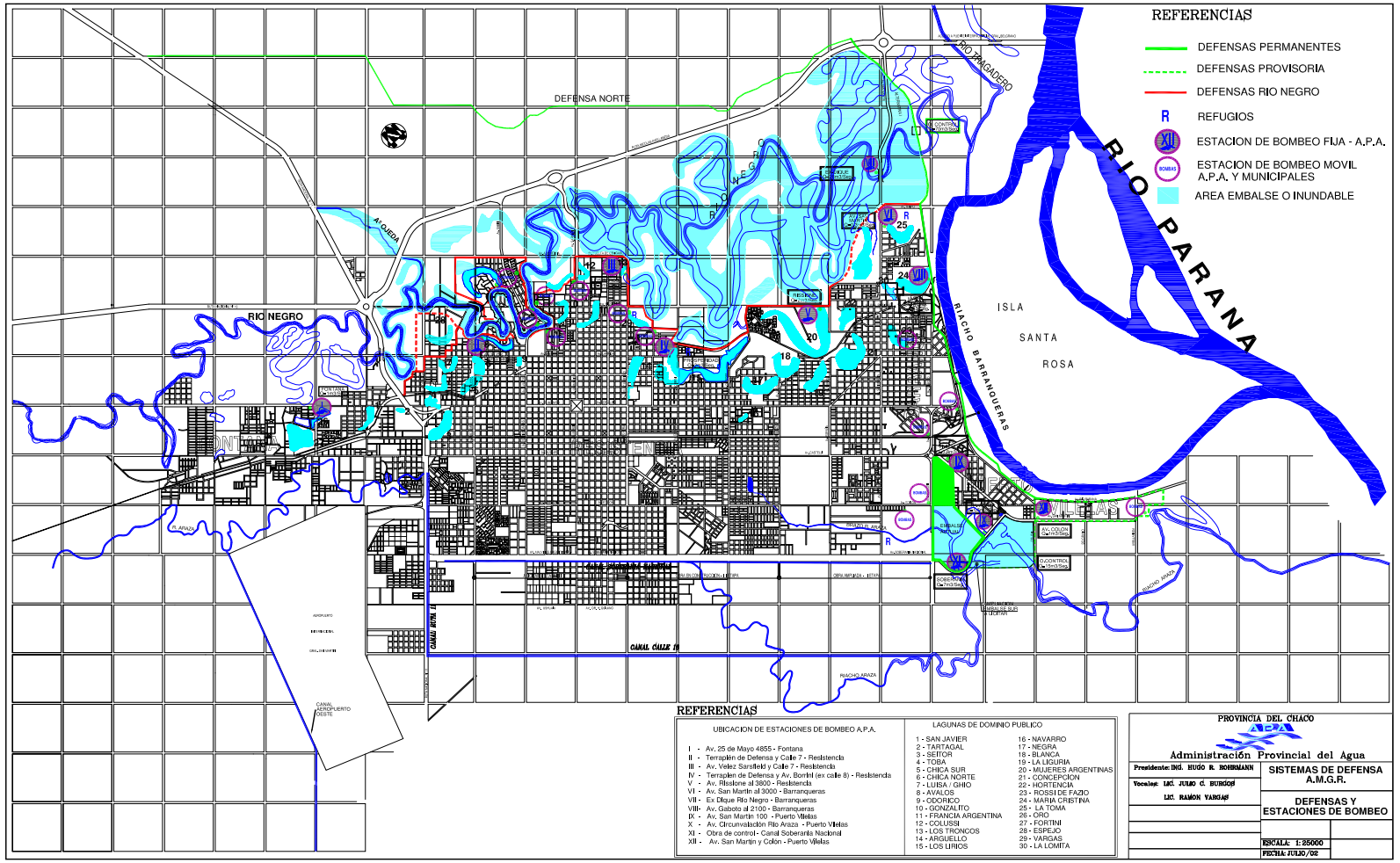

Figure 4.2 The flood embankments and pumping station in the Resistencia city region

Source: APA, 2002

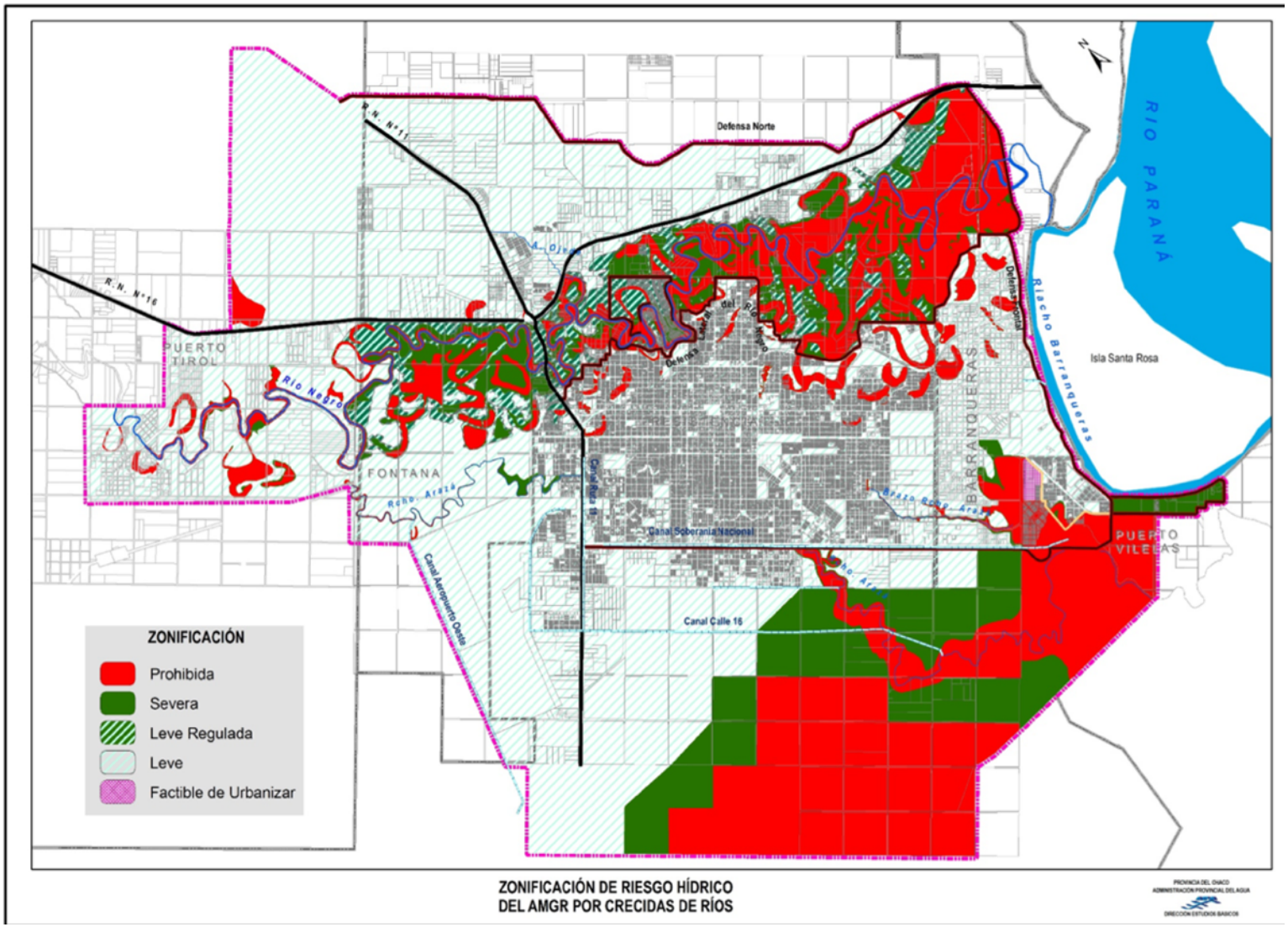

Figure 4.3 Flood risk zone map for Gran Resistencia in relation to rising river levels
Source: APA

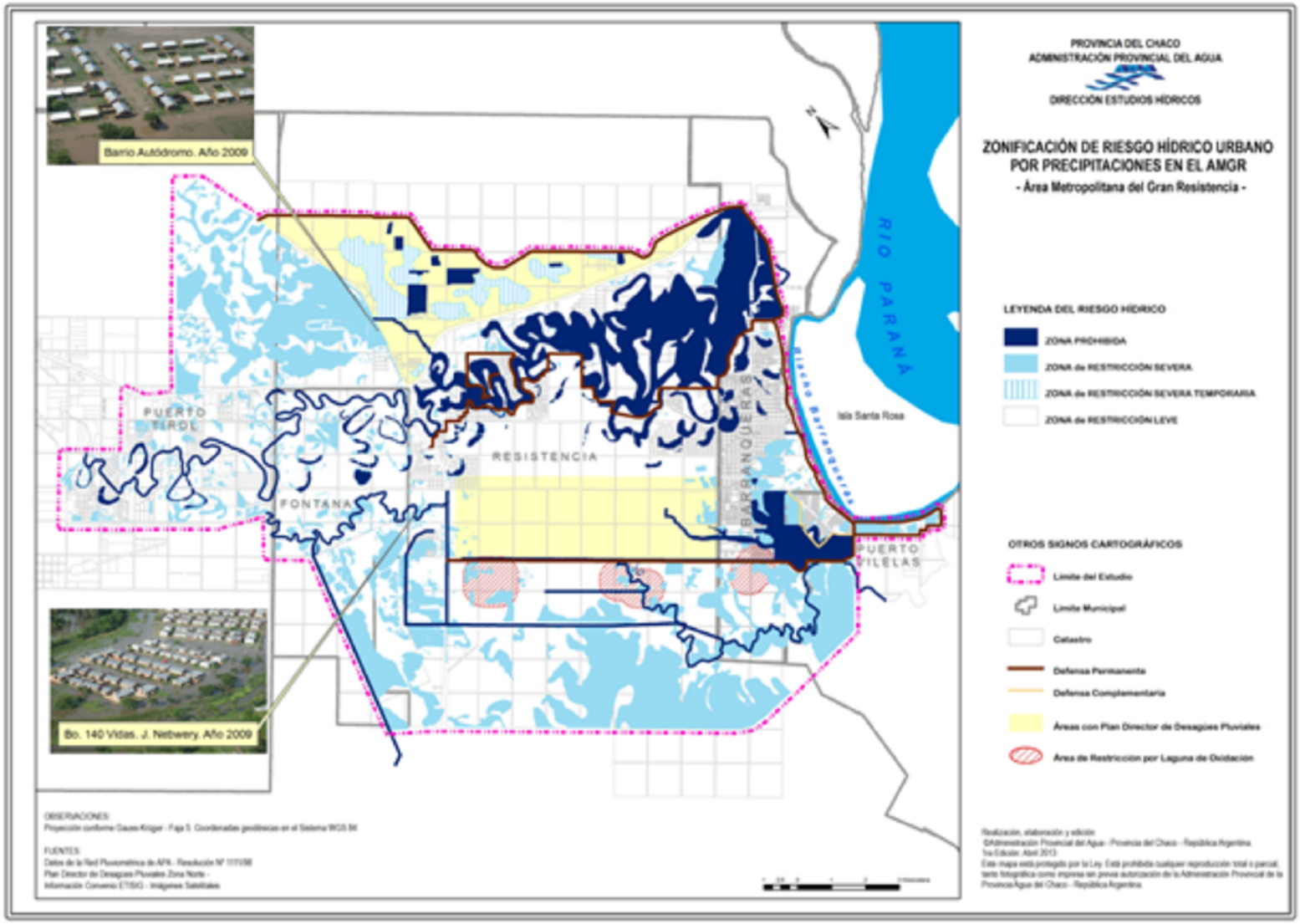

Figure 4.4 Flood risk zone map for Gran Resistencia in relation to rainfall
Source: APA

The aforementioned engineered defence system has, generally, been successful in recent years in keeping major flooding from the river at bay. However, despite those constructions, and the regulatory zonings of the provincial government, in the context of the rapid growth in population of the Resistencia city region, the constraints of the property market and intense rainfall, for many years, many poor people have continued to be socially marginalised and forced to live in hazardous locations prone to flooding, either inside or outside the defensive barriers; see Photo 4.8.

Photo 4.8 Major flooding in Antequeras
A flood victim uses a boat to show his flooded neighbourhood in Antequeras, located outside the defences of the Resistencia city region. Flooding of his house (on the left) had forced him to temporarily relocate to alternative accommodation by the main road through the settlement.
Source: Author, 2016

With the Resistencia city region not having been planned and managed to comprehensively cope with intense rainfall, shifting weather patterns due to climate change and El Niño and the rapid urbanisation, many people have a wealth of experience of living with and addressing different kinds of flooding event. The flooding has ranged from infrequent, major floods that have affected many thousands of people over a wide area, to more localised, incidents of flooding that may only impact on a small number of households for a number of hours. Certain streets can

encounter significant flooding as a result of only a few hours of heavy rainfall due to the lack of a suitable drainage system or simply as a result of a failure of the local government to arrange for an adequate waste management service and removal of rubbish from the flood drains that are in place. Whatever the cause, it is clear that many people live for several days of the year with flooding in their homes with the floor having been submerged under several inches of contaminated water, with obvious consequences for public health. There is, in fact, a multiplicity of issues of extreme poverty, vulnerability, insanitary conditions and consequent health problems facing many thousands of people who have lived and/or are living with conditions of flooding in the Resistencia city region.

Upon becoming flood victims, known locally as ‘inundados’, some become recipients of humanitarian assistance distributed by the government, such as food, water, clothes and mobile medical services, the provision of sandbags and building materials for the construction of temporary shelters, and transportation for belongings and livestock, for example. However, many have to employ more immediate coping strategies in fending for themselves and/or seeking help from friends, relatives, and neighbours and charitable responses from community groups and faith groups. For the poor, it seems clear that, there is a critical reliance upon social capital, particularly at times of flooding; see Photo 4.9.

Photo 4.9 Coping at a hazardous site in Barranqueras
A flood victim (left), having recently suffered river flooding at the site located outside the defences in Barranqueras, had been assisted by a relative in relocating her dwelling a few metres further uphill to the current position closer to the road. The branch of the River Paraná can be seen in the distance.
Source: Author, 2016

For some, lifestyles can involve a degree of acceptance of the need to move occasionally with a readiness to return when possible; see Photo 4.10. Attempts may also be made to continue cultural events, despite the challenging environmental circumstances; see Photo 4.11.

Photo 4.10 Family life by the river, Barranqueras
Back at the table with his recent catch of fish (seen hanging from the tree), the fisherman and his family live close to nature. The site, located outside the defences in Barranqueras, had been under water just a few weeks before.
Source: Author, 2016

Photo 4.11 Outdoor mass, Antequeras
A religious service taking place immediately adjacent to an area of flooding in Antequeras, outside the defences of the Resistencia city region.
Source: Author, 2016

Community initiatives using voluntary labour have also included building projects to adapt to the flooding in the region through enabling valued assets to be preserved; see 4.12.

Photo 4.12 Capilla Nuestra Señora de Los Milagros de Caacupe, Antequeras
The stilts of the newly built chapel proved essential during recent flooding.
Source: Author, 2016

A wide mixture of governmental and non-governmental adaptation measures, then, can be seen in the Resistencia city region.

The need for insights into the qualities of adaptation in the city region

With the impacts of El Nino and climate change looking set to increase the likeliness of flooding for the growing urban populations throughout South America, local capacities and the way in which an urban area is planned and managed are pivotal to whether or not any particular member of society is likely to avoid, cope with, or succumb to its impacts. Whilst major engineering projects have succeeded in keeping river flooding away from much of the inner city, the financial resources involved, lax environmental regulation and the failure of government to successfully address the intense rainfall in the area have brought the overall approach to disaster risk reduction in the city region into question. Nowadays, the focus of disaster risk reduction upon defending lives and assets against the threat of river flooding, appears all the more inadequate given the frequent failure of the drainage system to cope with intense rainfall either due to their insufficient coverage of the area and/or issues of

maintenance both before and during flooding episodes. Moreover, a combination of poor coordination amongst professionals and between professionals and the community, a lack of public sector funding and corruption means that limited resources are not always distributed to those who need it the most. A modest amount of emergency assistance is distributed during flooding events, however, with many of the vulnerable poor left to fend for themselves when flooding affects their neighbourhood, many regularly express their frustration in the constant cycle of political demonstrations in the city centre; see Photo 4.13.

Photo 4.13 Political demonstration in Resistencia city centre
Political demonstrations are a regular feature of daily life in Resistencia. This demonstration was outside the Casa de Gobierno, the Chaco provincial government building.
Source: Author, 2016

Given the complexity of circumstances, study of the area provides a good opportunity to understand how complex public health and environmental problems were and are being addressed within a flood-prone and resource-poor city region.

CHAPTER 5

Perspectives of professionals and politicians

This chapter provides the results of the Phase 1 data collection conducted between June 2015 and November 2015 in the Gran Resistencia city region within the four main localities of Resistencia, Barranqueras, Fontana and Puerto Vilelas, along with a further interview conducted in July 2016. Whilst the qualitative case study method had 'built-in flexibility' as it were, in order for it to contribute to an understanding of debates related to coping and adaptation to flood risk within economically marginal city regions, a structured distillation and presentation of the findings was considered necessary to separate out and highlight relevant subject areas from within the participant responses (Ritchie and Lewis, 2003; Bryman, 2012). To form the basis of the main body of this chapter, it was decided to organise the results of these semi-structured interviews around key themes in the hope that the views of the participants could inform policies to assist the most vulnerable and help in the development of more responsive approaches to addressing flooding. The framework chosen for presentation of the findings is based upon the work of Wamsler and Brink (2015) noted in Chapter 2. As such, the summarised findings below are structured in one of four categorisations, as follows: i) reduction and avoidance of flooding hazards; ii) reduction of vulnerability to flooding; iii) preparedness for responding to flooding; or iv) preparedness for recovering from flooding. These categories focus on both natural and societal drivers of risk and all the phases of the disaster cycle noted within Chapter 2. Each of the categories is sub-divided further into one of five themes, i.e. physical, environmental, socio-cultural, economic and political/institutional aspects of coping or adaptation, whether in reference to actual/existing measures or suggestions.

The framework was considered appropriate for highlighting a range of measures/activities for coping and adaptation and a variety of perceptions and suggestions with regard to the qualities and outcomes of such measures and any associated unused capacities. Perceptions of qualities noted could relate, perhaps, to the hazard focus (hazard-specific or multi-hazard), whether a measure is deliberate or unintentional, whether it is pre- or post-flooding and whether associated behaviour is

seen as individualistic, communitarian, hierarchical or fatalistic. Perceptions of outcomes could, for instance, be whether measures/approaches are perceived as effective, equitable, flexible and inclusive. Perceptions of unused capacities are noted since professionals and politicians and, indeed, the poor flood victims themselves can draw on and foster beneficial utilisation of them (Ibid, pp. 55-58).

Through adoption of the structured framework for presentation of the findings, then, key themes for the city region are highlighted through reference to relevant responses, and a number of boxes, interspersed within the text, provide a further focus on interviews that were considered particularly illustrative of the issues involved. Such grouping of responses fosters comparison of the views of professionals and politicians covered in this chapter and poor flood victims in the other results chapter, along with identification of the range and balance of measures and perceptions of the degree and quality of participation of the public and collaboration amongst urban authorities. As such, an overview could be grasped of the degree of sustainability, effectiveness and equitability in the approaches to coping and adaptation for the Resistencia city region and the appetite for transformed and transformational forms of governance. Along with Chapter 6, the clear and structured presentation of the qualitative findings within this chapter, then, lends itself to the later analytical interpretation of the collected data in Chapter 7.

The overall picture that has formed through distillation of the data collected has been of a striking difference between top-down perspectives on flooding of city authorities and the bottom-up perspectives on flooding of poor flood victims; this difference will be highlighted through comparison of the findings in this chapter with those presented in Chapter 6 and discussed further in Chapter 7. Three further themes have been revealed by the findings which, in their turn, form central strands to this thesis: an imbalance in scope and emphasis in relation to pre- and post-flooding approaches; a need for 'pro-poor' focus of the authorities with suitable processes for participation to better help the public inform approaches to flooding; and a need for better coordination/co-operation amongst different sectors. The sections that follow highlight these emergent themes within the aforementioned framework.

i) Reduction and avoidance of flooding hazards

This category concerns perceptions of strategies and measures for reduction and avoidance of existing or future flooding hazards. In theory, there can be a broad range of such strategies and measures and so, based on the work of Wamsler and Brink (2015), this section is subdivided into five aspects of strategies and measures, i.e. physical, environmental, socio-cultural, economic and political/institutional aspects, be they actual/existing or suggested/future strategies and measures. Each of these sub-sections forms a summarised record of perceptions of professionals and politicians with regard to the experience of reducing and avoiding flooding within the Resistencia city region. Where possible the assessment of the data has sought to identify comments with regard to the following characteristics: a) style(s) of approach (effectiveness, inclusivity, flexibility, equitability); b) public participation (degree and quality) and unused capacities; c) collaboration (degree and quality) and appetite for improved forms of governance. This focus in the data presentation facilitates the demonstration of the core thesis that there is a significant gap between the top down approaches of the professionals and the bottom up appreciation of the flood victims. Considered together, and in relation to the corresponding sections within Chapter 6, these sub-sections illustrate differences between top-down and bottom-up perspectives, highlight the imbalance in scope and emphasis of approaches to flooding, and note the absence of sound participatory practices and the need for better coordination/co-operation amongst sectors.

Physical aspects

A total of 24 of the professional participants (55.8%) referred to existing physical measures for reducing and avoiding flooding hazards in their responses. Participant responses gave mention of the system of defences and pumping stations that surround the city region. Participant 11 noted that "The unique system of defences, though similar to a Mexican and a Swedish example (the Swedish fligt system), has, primarily, focused on protecting the city from major flooding from the River Paraná, with two main pumping stations at Barranqueras and Laguna Blanca". Major flooding events had been witnessed over several previous decades in the Chaco province, though the polder system of defensive barriers, with those two main pumping stations, built and operated by staff from the Administracion Provincial del Agua (APA), has sought to

protect the region from major flooding for several years. Particularly informative descriptions of physical aspects to hazard reduction and avoidance were also provided in the interviews with Participant 1 and Participant 2, both planners from Resistencia, Participant 8, a politician and Participant 20 and Participant 25, both engineers at the provincial water management authority.

In terms of opinions over the quality of the systems/infrastructure, only 9 of the participants (20.9%) made reference to the system/infrastructure being weak in some regard. A number of professionals did acknowledge, however, that despite the system of defences, the risk of flooding was an ongoing immediate threat for some. Participant 1, a planner working at the municipal level in Resistencia, for example, noted there was "a high risk of flooding when several factors occurred together such as episodes of heavy rain, flood waters due to the control of the Yacyretá dam and the location of vulnerable households near to hazardous lagoons and coastal areas by the River Paraná". Also notable were comments made by Participant 3, a municipal council construction trainer of Fontana, and Participant 7, an engineer of the water management authority for Chaco province. Participant 3 remarked upon "the failure of the drainage and sewerage system to cope with intense rainfall" and Participant 7 remarked upon the "lack of maintenance of infrastructure…the significant risk of electricity failure…affects upon drainage due to informal sewerage connections and the risk of contamination of water". Participant 16, a town planner in the municipal council of Barranqueras, also noted that "the drainage system and pumping stations are inadequate to cope with intense rain…with implications for health".

Participant 19, a politician from Resistencia, and Participant 20 and Participant 25, both engineers in the provincial water management authority for Chaco, all noted that the significant growth in the urban population had overwhelmed the old sewerage systems. In their view, new, inexperienced arrivals to the city were infilling lakes and creating problems for other citizens. Mention was made of the current building of a further pumping station and bridge by Participant 2, a planner of Resistencia, and Participant, 26, a highways worker; however, more participants mentioned a need for the building of more infrastructure projects. Participant 1, the planner of Resistencia, for example, believed there to be "a need for further defences, pumping stations and drainage systems". Similarly, Participant 6, an engineer working at the municipal level

for Resistencia, Participant 7, an engineer working at the provincial level and Participant 8, a politician of Resistencia, and Participant 10, a planner for the provincial government for Chaco, all expressed a need for more infrastructure. Participant 12, a politician/architect working with a municipal council, commented that "investment is needed for both drainage and a project for sustainable development". Other professionals and politicians stressed the need for maintenance of the existing system of defences and drainage systems across the city; this was emphasised in the responses of Participant 3, a construction worker/trainer of Fontana, who said "a planning directive is needed to clean out rubbish". Participant 12, a politician of Resistencia, said "investment in drainage is needed" and Participant 23, an engineer in a provincial water management authority believed that "the pumping system needs to be adapted for the growing population". Participant 25, also an engineer in a provincial water management authority stressed the "need to put drainage systems in place prior to construction of buildings". Participant 19, a politician, highlighted the role of corruption in failure of early stages of the construction of defences (see Box 5.3).

There was considerable mention of a need for better drainage and maintenance, with suggestions for further physical adaptation measures made in the responses of 35 participants (81.4%). Many stressed the need for maintenance of the existing system of defences and it was also suggested by several participants that there was a need for the building of more infrastructure projects along with the building and maintenance of sewage and drainage systems across the city, particularly prior to street paving; these points were made by Participant 1, a planner for the Resistencia municipal council, and Participant 6, Participant 7, Participant 8 and Participant 43, all engineers of a provincial water management authority. Participant 43, a key worker in APA, also believed that there "ought to be encouragement for more construction upon stilts and the laying of permeable roads". The significant role played by the road network to the local economy was also noted by Participant 28, an engineer at the national Highways agency, who believed that there was "insufficient consideration given to highway maintenance". Participant 27, an engineer at a water management authority for Chaco province, on the other hand, in acknowledging a need to clean the drainage system and a need for further infrastructure up to a point, believed "a solution lay in relocating people to areas with less risk of flooding".

There was an overall perception amongst professionals and politicians that the extensive engineered system had been a success in its objective of addressing riverine flooding. Participant 43, a key engineer working at the provincial level, went further in expressing the belief that "the experience of dealing with flooding in Chaco held valuable lessons …. the system could be appropriate for other city regions". Taken as a whole, the views of the professionals tended to be technocratic and stress their role in the planning and engineering of a system with a primary focus upon engineering projects / 'hard measures' for protection of the city from major flooding of the River Paraná undertaken by professionals working in hierarchical organisations. However, there was little or no mention of more homespun / 'soft measures' taken amongst the community to adapt to flooding at the level of the neighbourhood and individual households. As such, the responses demonstrated little awareness of issues of equity and effectiveness of physical aspects of reduction and avoidance of hazard in improving the circumstances of the poorest and most vulnerable; there seemed, therefore, to be a significant gap in perceptions which represents a huge problem area.

Environmental aspects

Participant 11, an academic with a background working as an engineer, emphasised his belief that "flooding in the region is mainly due to hydrological issues rather than political ones". Participant 30, an academic, believed "there is a need to restore lagoons"; similar comments were made by Participant 11, Participant 12, a politician of Resistencia, and Participant 14, a planner/emergency management worker from Barranqueras. Participant 20, an engineer of the provincial water management authority for Chaco province, believed that, along with the significant growth in city population outstripping old sewerage systems, the low lying, flat terrain and El Nino were main causes of flooding, and noted that "flood waters remaining at a site for a period of time had particular health risks for children". Participant 17, an emergency management worker of the municipal council of Barranqueras, believed that "the release of water from dams upstream affected the region … this has health and social implications, such as impacts on pregnant women and education of children". Participant 43, an engineer with a water management authority for Chaco province, noted significant impacts upon rural communities in remarking that "flood risk poses a problem for crops and animals". Participant 33, a politician/social worker, suggested

that “there ought to be more tree planting to combat flooding” and Participant 29, a politician working in the provincial government for Chaco, expressed the view that “the planning system needed to have greater flexibility and operate in a way that works with natural events rather than against them”. By and large, there were few comments made, however, in relation to environmental aspects of flood hazard reduction and avoidance.

Socio-cultural aspects

A total of 29 participants (67.4%) referred to socio-economic and cultural aspects of flood risk reduction and/or avoidance in their responses. Several noted a lack of coordination, poor distribution of resources and an overall drop in consciousness in relation to flooding amongst politicians, professionals and the community alike; this lack of readiness and/or mindfulness in relation to flooding and associated impacts on the part of local citizens was noted in particular, by Participant 1, a planner in Resistencia, Participant 22 and Participant 25, engineers from the provincial water management authority. Participant 10, a planner for the provincial government for Chaco, did note that “flooding can cause isolation for victims”. A number of responses did, however, apportion blame upon the community for circumstances encountered. Two participant responses, for example, blamed a weakening of the flood defences because of human activities, i.e. Participant 1, a planner in Resistencia, and Participant 24, a lawyer for a provincial water authority. Participant 1 pointed out that “defences are weakened by traffic driving upon them” and Participant 24 believed that “people rob parts of the defences for use as building materials”. Interestingly, the observation was made by Participant 21, an engineer of a provincial water management authority, that “in the Rio Negro area…the rich too are breaking the rules”. Participant 22, also an engineer of the provincial water management authority, also noted that both rich and poor alike occupy areas prone to flooding in contravention of the APA flood risk map guidelines. Whilst well over half of participants mentioned socio-economic and cultural aspects to flooding, little or no mention was made of how socio-cultural measures could be employed in avoiding or reducing flooding hazard.

In difficult social and economic circumstances, vulnerable poor people are, in the main, faced with the harsh realities of having to cope as best they can in hazardous

locations. The provision of humanitarian assistance in moving animals/livestock was mentioned by Participant 20, an engineer in a provincial water management authority. As well as being involved with capacity building of fellow workers, Participant 4, an emergency management worker of Fontana, mentioned how he had "helped in the construction of adaptation measures at the home of a neighbour outside of the normal work routine". Both Participant 4 and Participant 9, a social worker for the provincial government, recognised occupation of hazardous areas as a livelihood strategy. Participant 19, a politician of Resistencia, and Participant 25, an engineer in the provincial water management authority, showed an awareness of security matters and protection of belongings being a reason why some members of the community may stay behind in a flooded area. Also, a need for more housing was noted by Participant 36, a school director and housing worker of Barranqueras, and Participant 40, a health worker in Puerto Vilelas, with the latter also remarking that "there needs to be more opportunities for recreation". However, such insights/observations were rare. In contrast, mention was made of the spontaneous infilling of lakes by a rapidly growing urban population in the city region, with new arrivals perceived as lacking in experience and education, showing complacency, ignoring advice and lacking willingness to leave flooded areas; such points were made by Participant 7 and Participant 25, engineers in the provincial water management authority and Participant 26, a national Highways worker, for example. Participant 7 believed that 'the community do not understand" and Participant 25 said that "people infilling pushes the problem onto someone else". Participant 26 said "people return to areas of flooding…we should have more education". In general, the comments of the professionals and politicians often placed blame upon the community for failure of the system to cope with the challenges of the city region.

Economic aspects

Overall, there was little mention of the economic implications of measures to reduce and avoid flooding hazards by professionals and politicians other than comment on under-resourcing which was particularly stressed by Participant 1, a planner in Resistencia; she noted that "for better urban planning, there is a need for more human and economic resources, in both quality and quantity and more monitoring". Anecdotally, it had seemed to the researcher that corruption was a prominent issue for

Chaco and so it was placed within the semi-structured guide as an issue that warranted a question. However, comments related to corruption were made by only 15 participants (34.9%); perhaps mention of corruption by professionals and politicians was limited due the sensitive nature of the theme for these holding public office. However, some strong opinions regarding maladministration of the economy and/or corruption were put forward by a number of participants. Such views ranged from a mild perception that there was a lack of coordinated action (such as those made by Participant 1 and Participant 5, planners of Resistencia and Fontana municipal councils, respectively, and Participant 6, an engineer from Resistencia) to stronger feelings that jealousies and lack of cooperation were hampering development significantly (such as those expressed by Participant 2, a planner in Resistencia, Participant 9, a social worker for provincial government and Participant 26, a national Highways worker). Participant 11, an academic, mentioned that "people are being given public sector posts without suitable educational qualifications". Stronger still was the view that corruption was akin to a civil war with certain opportunistic politicians buying votes at election time and keenly taking advantage of flooding for personal gain, such as comments made by Participant 9, a provincial government social worker, and Participant 19, a leader of a local political party. Participant 9 believed that "different causes of flooding were being hidden from the public". Participant 19 believed that "malnutrition in the region and death rates were being hidden" and also noted that "land in the interior is being given to corporations for soy production and … the government is favouring big business and failing to prosecute when there is project failure". Box 5.1 and Box 5.3 below illustrate the theme of corruption a little further.

Political/institutional aspects

A total of 26 participants (60.5%) made reference to political aspects to existing measures to reduce and avoid flooding hazards. Participant 43, a key water management engineer for the province, emphasised the importance of good planning and recommended that "for urban development in an area at risk of flooding, there should always be a suitable plan for drainage and sewerage systems in place prior to construction". To that effect, Resolution 121/2014 is a recent attempt to help avoid detrimental impacts upon drainage through the control of new construction. As well

as the thorough explanation given by that particular, well-experienced engineer, Participant 1, a planner of Resistencia, also with many years of experience, was particularly clear in noting the "important role played by the APA flood map". Participant 25, an engineer in the provincial water management authority, explained that "the flood risk map, that has acted as a guide for development in the city region, was based on the report of an international consultant, and was authorised by government in Resolution 1111/98. Also, with the support of Resolution 1111/97, APA was given the power to remove unauthorised occupiers of land at risk of flooding". As well as responsibility for the implementation of the flood risk zones, further responsibilities for APA were noted by Participant 16, a planner from Barranqueras municipal council, and Participant 21 and Participant 22, both engineers from a provincial water management authority; activities noted included the monitoring and evaluation of hydrological and meteorological data and the alerting of relevant agencies when there is a flood warning, with notification of the public through the use of a website, the radio and newspapers. In organisational terms, it was noted by Participant 25, an engineer of a provincial water management authority, that "the work of APA is interdisciplinary in nature…. achieved through collaboration both between various professional disciplines and across political boundaries to neighbouring authorities".

Many noted the importance of appropriate planning though some noted that implementation of flood risk policy on the basis of the APA flood zone map, for which APA had responsibility, had been weak or non-existent. Indeed, given the growth in the population of the city, a number of responses expressed a wish for better implementation of the existing policies related to flood risk and land use. Participant 1, a planner in Resistencia municipal council, and Participant 21, an engineer, and Participant 29, a politician, who were both working in a provincial water management authority, for example, noted how the planning system was not being applied strictly enough and was not sufficiently dynamic to adapt to the ongoing rapid urbanisation. Participant 36, a school director of Barranqueras, believed there was "a lack of vision", and Participant 38, a teacher, also from Barranqueras, noted there was "a lack of preparation for a big flood".

Strategic suggestions were made by 23 participants (53.5%) and these ranged in sentiment considerably. Participant 6, a water management worker/engineer of the municipal council of Resistencia, expressed the view that there is "a need for more projects... plans for rehousing away from the flood zones". Participant 9, a social worker working for the provincial government for Chaco province, also stressed there was "a need to shift people away from the river". Participant 32, a politician and planner for the provincial government for Chaco expressed the view that, "as well as more infrastructure… there is a need for good places to be identified for relocating people". As well as expressing the view that the existing defences needed to be maintained, Participant 23, an engineer for the water management authority for Chaco province, also believed that "people ought to be given land". Participant 9 also believed that "shifting people away from areas close to the river would reduce risk and release land for recreational use". Whilst expressing the view that there was a need to clean the drainage system, a lack of sewerage systems and a need for further infrastructure up to a point, Participant 27, an engineer / politician for the provincial water management authority, and Participant 36, a school director of Barranqueras, also stated that there needs to be relocation of people to higher areas with less risk of flooding with new housing and drainage systems.

Participant 19, a politician/leader of a local political party in Resistencia, acknowledged that "the water system cannot cope with the informal settlements" though he stressed there was "a need for government support to focus more upon house building rather than expensive infrastructure projects". For Participant 11, an academic with a background working as an engineer, "better management of the city region requires better behaviour from the community" and he believed that "a potential solution lies in rolling out an education programme." As noted above, a number of responses noted the need for better implementation, with Participant 22, an engineer of a provincial water management authority, also noting that "better control, to limit infilling on prohibited lands and the building of houses without services, would have public health benefits". Participant 14, a planner/emergency management worker in the municipal council of Barranqueras, noted that "flooding has a negative impact on health and… there is a need for improvement to the drainage and pumping stations". The need for better provision of drainage and sewerage systems prior to construction, rather than after it, was mentioned within the responses of Participant 25 and

Participant 43, both engineers, and Participant 31, a chemical engineer, all of whom were working for the provincial water management authority for Chaco province. Participant 3, a construction trainer from Fontana, also expressed the view that "there is a need for a planning directive to clean out rubbish from the drainage system".

Some, on the other hand, acknowledged the failings of government with the view being expressed of a need for more serious approaches to community participation within the planning process and/or the need for better coordination amongst professionals. In terms of greater public participation, the most notable supportive responses for such came forward in the interviews with Participant 2, a planner in Resistencia municipal council, Participant 5, a planner in Fontana municipal council and Participant 16 and Participant 17 from Barranqueras municipal council, a planner and an emergency management worker, respectively. Participant 2 said that "public meetings are needed to gather opinions prior to public works" and Participant 5 believed there was a "need for better representation". Participant 16 believed it necessary "to arrange a time and place for strategic talks with the community" and Participant 17, in noting the current lack of participation in planning measures, recollected that "there had been a consultation exercise in the past and it was stopped". In terms of better coordination between professionals, it was interesting to note that Participant 22 and Participant 27, both engineers with a provincial water management authority, believed there ought to be better protocol/evacuation plans with the latter also suggesting that "new teams replacing retiring staff ought to comprise a mixture of professionals such as sociologists and psychologists rather than just engineers". Overall, many professionals and politicians accepted that current approaches to planning and management were inadequate to address the risks facing the rapidly urbanising city region. However, it was apparent that some were quick to apportion blame upon the flood victims themselves.

Box 5.1 Planner, municipal council
(Participant 1: Female; Interviewed by author on 14th July and 19th August 2015)

An interview that was considered illustrative of some of the issues related to reduction and avoidance of flooding hazards, particularly in respect to political aspects, was that conducted with Participant 1, a town planner. She believed there was a need for further big infrastructure projects and better maintenance of the existing bank funded defences and drainage system and, having worked in town planning for many years, remembered the emergency of 1998 and recollected how flood risk had been exacerbated by several factors conspiring simultaneously, i.e. climate, the location of property near to lagoons, the control of the Yacyretá dam and the fact that the city defences had not been completed. She recognised the ongoing nature of the flooding issue due to heavy rain and the collapse of sewage systems, which had been leading to contamination in poorer neighbourhoods and health impacts, such as skin disease and respiratory disease, and felt there needed to be much more of a focus on helping the poor.
She believed there ought to be much better funding and coordination of urban planning to reduce the risk of disaster, however she was realistic about the chances of the huge amount of investment required being forthcoming. She had awareness and practical experience of the impact of the lack of both economic and human resources, both for society and for the running of the planning office. Furthermore, she mentioned that the buying of votes by politicians had been a problem for many years and noted that the government was failing to address the pernicious impacts of corruption successfully. Not only did she note that heads of government, at both the provincial and municipal level were favouring big business in their decision making, she also noted that they were pulling rank on government officials and taking advantage of flooding for personal gain.
The comments of the planner were, on the whole, very insightful with regard to such political aspects of the reduction and avoidance of flooding hazards. Despite the highlighting of widespread corruption, she did mention that there had been cooperative working between the planning department and APA in writing flood risk policy and producing the flood risk map, that there was an ongoing evaluation to improve matters and that there had been an interdisciplinary team working with the Toba Indian community. The impression given, however, was that, on the whole, control of development was weak or non-existent. She believed there needed to be better coordination between technical teams and better implementation of existing policy and, overall, she expressed the view that politicians were not really ready to deal with the issue of flood risk properly.

ii) Reduction of vulnerability to flooding

There can be a broad range of such activities and so, based on the work of Wamsler and Brink (2015), this section is subdivided into themes, i.e. physical, environmental, socio-cultural, economic and political/institutional activities (be they actual/existing or suggested/future activities). Each of these sub-sections forms a summarised record of perceptions of professionals and politicians with regard to the experience of reducing vulnerability to flooding within the Resistencia city region. Where possible the assessment of the data has sought to identify comments with regard to the following characteristics: a) style(s) of approach (effectiveness, inclusivity, flexibility, equitability); b) public participation (degree and quality) / unused capacities; c) collaboration (degree and quality) /appetite for improved forms of governance. Considered together, and in relation to the corresponding sections within Chapter 6, these sub-sections illustrate differences between top-down and bottom-up perspectives, highlight the imbalance in scope and emphasis of approaches to flooding, and note the absence of sound participatory practices and the need for better coordination/co-operation amongst sectors.

Physical aspects

Many residential streets in the Resistencia city region flooded during times of heavy rainfall and many participants mentioned that problems were exacerbated by a number of physical aspects to urban management. A total of 38 participants (88.4%) did, in fact, make comments related to physical aspects to reduction of vulnerability to flood risk. A number of participants noted the unfinished defence system, the failure of pumping stations to work properly or to full capacity, or the lack of electricity, and the inadequacy of the drainage system, sewers and water supply. Participant 3, for example, noted that "rainfall is a continual problem…water drainage is affected by new buildings. Few people have sewers and where there are sewers they collapse when it rains and there are cuts to electricity". Participant 5, a planner of Fontana, emphasised "Rushed, inappropriate building, both formal and informal, causes flooding and there is a need to clean canals". In fact, many participants mentioned issues of maintenance such as the collapse of the existing sewers, the affect upon the flow of water due to both formal and informal building projects, the failure to clear away rubbish, and the need to clear out the canal to the south of the city. Other notable

responses in this regard were made by Participant 1 and Participant 2, both planners of Resistencia, and Participant 6, an engineer with responsibility in Resistencia, who noted that "rubbish in drains is significant and contamination with sewerage is having an effect on public health". Participant 7, an engineer of a provincial water management authority, noted "there is a need for cleaning and a need to guarantee electricity supply with mobile generators. Works are needed because of the population growth". Participant 8, a politician of Resistencia, believed there was "a need for big, structural works…pumping station and canals". Participant 27, a politician and engineer, commented that "there needed to be better maintenance and a plan of evacuation". The views of Participant 25, a water management engineer, were particularly relevant with regard to physical aspects of vulnerability reduction (see Box 5.2 below).

Environmental aspects

A total of 27 participants (62.8%) referred in their responses to international/global causes that they considered impacted upon flooding in the city region. Several participants mentioned the effect of El Niño, La Niña and climate change, and Participant 17, an emergency management worker of Barranqueras, even noted that "the moon influences the height of the River Paraná". Participant 26, a national Highways worker, mentioned that "deforestation in Brasil, and the release of waters from the Yacyretá Dam in Paraguay lead to periods of flooding downstream". A greater number of participants, i.e. 33 (76.7%), referred to local and regional natural/ environmental factors being causes of flooding including heavy local rain, flooding from the Rio Negro and Rio Paraná, the low lying and flat nature of the city region, and the location of the city region within a flood plain. Participant 11, an academic, was particularly informative with regard to the local topography and emphasised that "The city region suffers different types of flooding though, fundamentally, it sits at the heart of a basin". Participant 33, a social worker in Resistencia, believed "there ought to be more tree planting". Despite general awareness of the environmental issues for the city region, there was, however, little mention by professionals or politicians of how environmental measures could be taken, or were being taken, to reduce

Box 5.2 Water Management Engineer, regional water management authority (Participant 25: Male; Interviewed by author on 31st August 2015)

An interview considered illustrative of some of the issues related to reduction of vulnerability to flooding, particularly in respect to physical aspects, was that conducted with Participant 25, a water management engineer. The participant believed that there had been a considerable degree of collective consciousness in relation to the social capital and resilience needed to deal with flood risk up until a time about 7 years prior to the interview. He felt that nowadays, however, people were much more complacent, especially those living inside the city defences and, as many of those with the relevant expertise and experience were too old and/or retiring, there was a need for more capacity building with regard to flood risk. The views of the engineer were actually very broad ranging and insightful and, having had several decades of experience in dealing with flooding in his professional working life, his perceptions were coloured with a strong recollection of his experience of the emergency of 1982 when the city defences broke. He considered that if such an incident were to occur nowadays, on a similar scale to the emergency of 1982, then the impact would be much worse due to the growth of the city.

The participant gave several revealing insights with regard to political aspects to coping and adaptation in the Resistencia city region. For instance, he noted that corruption was particularly rife in public life in Chaco and referred to politicians hiding a wealth of statistics in seeking to acquire votes and World Bank funding. He saw the implications of such corruption as being not solely financial but also life-threatening and, in his view, the hiding of statistics and the poor decision making were resulting in premature deaths. In terms of socio-cultural aspects, the engineer had awareness that some people stayed behind to protect their possessions during a flooding event and he believed that this had a bearing on health depending on the length of exposure to hazards. He also expressed the view that assistance, such as in the form of provision of food, was inadequate given the scale of the problems involved.

Given his many years of relevant experience working within APA, the comments of the engineer were, perhaps, even more authoritative in respect to physical aspects to reducing vulnerability. He mentioned that the development plans of APA for the city defences, based on the work of Sir William Halcrow, and the flood risk map that acted as a guide for development were outdated and that the planning and management for the city region lagged well behind the actual growth of the city. He recognised that many people contravene the APA plan by infilling on prohibited lands that are hazardous and that those tended to be poor people. He noted that, given the ongoing flood risk due to heavy rain, the drainage system for the growing urban population inhabiting the area was not good enough. He believed that infilling and the building of houses without services were pushing problems onto others and, along with poor waste management, these factors were increasing the level of risk, especially with regard to the health of children. He believed there to be a reasonably good level of collaboration between the technicians of the various municipalities within the city region in respect to agreement over the flood risk map, noting that municipal councils had responsibility for drainage within their areas and that trans-boundary issues were the responsibility of provincial government. However, overall, he considered that current physical approaches to reducing vulnerability were proving to be inadequate in light of the risks facing the rapidly urbanising city region. The participant was clearly of the view that the quality of adaptation for the area was poor and he would welcome more serious approaches to improving community participation within the planning process.

vulnerability to flooding. Their comments were peripheral not central to their reading of the problem.

Socio-cultural aspects

A total of 35 participants (81.4%) referred to the impacts of flooding on health in their responses. In fact, with 4 (9.3%) of the participants being health workers and 4 (9.3%) being social workers, some of the participants did have a deep understanding of the risks that flooding poses for health in the city region. Health implications were noted by Participant 8, for example, a politician in Resistencia, who mentioned that flooding caused a proliferation of sicknesses, as did Participant 14, a planner from Barranqueras. Participant 32, a politician working in provincial government, noted that "flooding resulted in diarrhoea and respiratory disease and accidents from broken glass in water, affecting the young and old in particular". The comments of Participant 15, an epidemiologist working for the provincial government, were particularly insightful and informative. She noted that "people accustomed to living in hazardous areas ignore advice and return back to risky areas shortly after flooding events… Problems can exacerbate following a flooding event, when standing water remains, and poor environmental management can lead to infestation of rats and contamination of occupied areas in and around lagoons. The government ought to be more proactive in rehousing evacuees". As well as reference to the risks posed from various creatures such as spiders, rats, scorpions and snakes, she made reference to respiratory and skin diseases, pneumonia and allergies, and also said "There has been the re-emergence of a number of vector-borne diseases, hantavirus, leptospirosis, dengue, a number of other serious diseases including West Nile virus and encephalitis, as well as malnutrition". Having discussed public health with a local doctor working in the area, the author later received a publication from him confirming that there are also incidences of leprosy in the region (Sociedad Argentina de Dermatologia, 2018).

Participant 31, a chemical engineer working for the water management authority for Chaco province, stressed that "occupation of hazardous areas brought with it high risks for health…there is a need to improve drainage systems". Two professionals working in Barranqueras municipal council, Participant 16, a town planner and Participant 17, an emergency management worker, also noted there were implications for health due

to the inability of the drainage system to deal with intense rainfall and the release of waters from the dams upstream; the latter of the two stressed that there were "health implications for pregnant women and social implications due to effects of flooding upon the education of children". Participant 39, a health worker/administrator of a medical centre in Barranqueras, and Participant 42, health workers from Barranqueras and Puerto Vilelas, respectively, noted that flooding posed health problems. Participant 39 stressed that sicknesses "primarily affect children. There is not sufficient focus given to the conditions of the poor". Participant 42 emphasised the significance of water supply to health and the importance of "going to the vulnerable, the old and pregnant". Participant 20, an engineer of the provincial water management authority for Chaco province, believed that "along with the inadequacy of old sewerage systems due to the significant growth in city population, the low lying, flat terrain and El Nino were the main causes of flooding…flood waters remaining at a site for a period of time had particular health risks for children". Participant 25, an engineer for the provincial water management authority, also noted that flood waters remaining at sites had particular health risks for children. It was noted that accidents (including traffic accidents) can have an impact on health during a flooding event and that there can be mental health and emotional problems and trauma for those who are victims of flooding. Participant 4, for example, an emergency management worker for the municipal council in Fontana, considered that "numerous health problems for flood victims in Fontana were being overlooked".

During the course of the study, major flooding occurred to the east of the metropolitan area in Puerto Vilelas and Antequeras due to a rise in level of the river Paraná (Dec. 2015 - Mar. 2016). Several members of the community had to move to alternative accommodation and the flood waters remained in situ for many weeks before members of the community were slowly able to return to clean-up their previously occupied sites. Whilst awareness of the health impacts of flooding in poorer neighbourhoods was shown by a number of interviewees, such as the particularly insightful comments given by the epidemiologist Participant 15 (see Box 5.4), instances where there was expression of an understanding the socio-economic and cultural circumstances of the most vulnerable were rare. Some professionals and politicians did recognise socio-cultural aspects of reduction of vulnerability, however, in noting that some poor flood victims decided to stay behind to protect their possessions during a flooding event

whilst others moved to nearby schools for shelter. Participant 25, a provincial water management authority worker, for example, noted that "impact on health of flooding depends on how long it remains… though people stay behind to protect their things". Participant 26, worker at the national highways agency, noted that "the community was evacuated to schools". Participant 1, a planner of the municipal council of Resistencia noted "work was undertaken with the Toba Indian community…however there has been insufficient interdisciplinarity amongst technical teams …and a need for municipalities to coordinate better".

A few notable comments were made in relation to social-economic and/or cultural aspects/implications of flooding, however; in fact, a total of 19 participants (44.2%) made reference to such matters within their responses. Participant 18, a politician working in the municipal council of Puerto Vilelas said that 'the community help themselves, they participate in solving their own problem". Participant 19, a politician and leader of local political party in Resistencia remarked that "there is a history of people helping themselves organically". Participant 41, a teacher/school director of Puerto Vilelas noted that "living with risk is a livelihood strategy for the poor… there is a need for a programme of education for sustainable development with more public participation". Further socio-economic and cultural issues such as disruption to schooling and family life, conflict and racial tensions were mentioned by a number of interviewees. Participant 10, a planner for the provincial government noted that "flooding can cause isolation for victims" and Participant 40, a health worker in Puerto Vilelas, remarked that "there needs to be more opportunities for recreation". Participant 2, a town planner with the municipal council of Resistencia mentioned that "the community pulled together at times of hardship" though believed "there is a need for capacity building and training to better understand different cultures, such as the Qom Indians". Participant 5, a town planner working with the municipal council of Fontana noted that "there had been ethnic tensions between Qom and Witchi peoples and other residents with regard to construction that had been affecting water flow". Mention was also made by Participant 15, the epidemiologist working for the provincial government, of a fatality, and she related how the mother of the deceased had been behind a political campaign against dumping of waste/scrap, following the death of her daughter due to infection.

A total of 22 participants (51.2%) referred to existing socio-economic and cultural adaptation measures to reduce vulnerability within their responses. Mention was made of the provision of sandbags and construction materials for temporary housing, medicines and vaccines, mattresses, and groceries during flooding events and help provided in moving animals/livestock. It was noted by Participant 15 that "take-up of vaccines was poor…and there is a need for better communication with regard to the risks that flooding presented". It seemed clear that health professionals and social workers had a great deal awareness of the plight of the poor that could help better inform processes of development planning and adaptation. However, it seemed that their concerns were not being given due consideration by those with responsibility for the development of the city region. Indeed, some professionals and politicians seemed unaware of socio-cultural aspects to reducing vulnerability, with some seemingly rather unsympathetic.

Economic aspects

The need for a pro-poor focus was noted by 10 participants (23.3%) such as Participant 1, a town planner of Resistencia municipal council. Participant 16, a town planner with Barranqueras municipal council, believed "there needs to be a greater focus needed on the poor". Participant 4, an emergency management worker in Fontana municipal council, believed that "greater redistribution to the poor is needed". Participant 5, a town planner of Fontana municipal council, also believed that "a greater focus upon the poor should include better representation and help with achieving legal status for land". Participant 17, an emergency management worker with Barranqueras municipal council believed "a pro-poor focus needed to be backed up with the provision of work opportunities for flood victims". Participant 21, an engineer/emergency management worker with a provincial water management authority, also believed "there ought to be a greater focus on the most vulnerable and greater public participation". Participant 30, a research assistant/academic working in a provincial water management authority, noted that "a pro-poor focus ought to be accompanied with efforts to make the community more informed". In general, there was little mention of economic aspects of reducing vulnerability amongst the professionals and politicians. There were a couple of notable exceptions, however. Participant 17, an emergency management worker of Barranqueras, suggested that "relevant salaried work ought to

be provided for flood victims to help with adaptation measures" and Participant 19, a politician, sympathetically stressed that "consideration ought to be given to the wider regional economic picture and the problems encountered by the rural population that was leading to them migrating to the city region". The interview with Participant 19 was considered particularly illustrative of some of the issues related to reduction of vulnerability to flooding, particularly in respect to economic aspects, and is considered further in Box 5.3.

Box 5.3 Politician
(Participant 19: Male; Interviewed by author on 21st August 2015)

An interview considered illustrative of some of the issues related to reduction of vulnerability to flooding, particularly in respect to economic aspects, was that conducted with Participant 19, a politician. The participant stressed that greater consideration ought to be given to the wider regional economic picture. He mentioned that within the region, land had been given to corporations for growing soya and there had been malnutrition and deaths for many living within the interior of Chaco due to coercion, unemployment and malnutrition. It is within this context that many had moved to the city seeking to improve their livelihoods. The participant stated that the infrastructure system could not cope with the informal settlements that had sprung up in the city region and that flooding tended to impact most upon the vulnerable poor, who were commonly affected by diseases of the skin and respiratory system.

The participant noted that the defences of the city region were built by the previous military government and, along with planning system in general, had proved, by and large, to be ineffective given the challenges the region now faced. He believed capitalist-driven development had impacted upon the sewer systems of others though, rather than focusing upon housing and helping the vulnerable poor, the government tended to focus on supporting business. He believed that corruption in the region was rife and, by way of example, he mentioned a failure to prosecute anyone following the collapse of a dam in 1970 that had been built by a private company. As a further example of how deep he believed corruption had gone, he mentioned the hiding of death rate statistics so that the magnitude of the problem of flooding was less widely known.

In terms of social capital and resilience, he explained that people stayed behind in times of flooding to guard against robbers, and that there was a developmental history in the region of people helping one another. However, as a politician he was compelled to help mobilise the community in articulating demands for the government to clean the system of drains and pumps to reduce vulnerability to flooding. Overall, the politician felt there were broad macro-economic reasons for the vulnerability in the region and felt that the government needed to focus more on its basic duty of helping to reduce the vulnerability of the poor through the provision of jobs and housing.

Political/institutional aspects

The views of professionals and politicians with regard to political/institutional aspects to vulnerability reduction were mixed. Several noted a need for improved longer-term planning and management of the city region with better funding, enhanced participation, improved coordination and collection of statistics, and better communication of health messages. A need for more housing was noted by a number of interviewees. Participant 19, a leader of a local political party, who felt compelled to help mobilise the community in articulating its demands, had noted how wider, regional economic issues were causing vulnerability, and felt that "the government needs to focus on its basic duty to help in the provision of jobs and housing". Participant 36, a school director and housing worker of Barranqueras, also remarked that "better housing was needed with flood drains and upon higher land" and Participant 40, a teacher of Puerto Vilelas, also said "more housing is needed with recreation areas for children". Another sympathetic participant, Participant 8, a politician working in Resistencia, mentioned the PROMEBA programme for improving the quality of life of the vulnerable and noted that "the poor suffers the most…the community is angry in making its political demands". Participant 33, a politician/social worker in Resistencia municipal council, noted the direct action that had been made with the blocking of streets. Apart from remarking upon the political campaign against dumping of waste/scrap by a bereaved mother, Participant 15, an epidemiologist working for the provincial government, however, noted that "there is a general passivity amongst the community with regard to dealing with environmental management issues". Some participants maintained a view that flood victims were to blame for their circumstances and stressed the view that there was a need for stronger control and implementation of existing policy to keep risky flood areas bordering on to lagoons and rivers free of housing. Taken as a whole, however, professionals and politicians did not tend to see measures for reducing vulnerability to flooding of the poor as an urgent political priority; this is a major finding of the thesis from the interview results.

iii) Preparedness for responding to flooding

There can be a broad range of such activities and so, based on the work of Wamsler and Brink (2015), this section is subdivided into themes, i.e. physical, environmental, socio-cultural, economic and political/institutional activities (be they actual/existing or suggested/future activities). Each of these sub-sections forms a summarised record of perceptions of professionals and politicians with regard to the experience of preparing to respond to flooding within the Resistencia city region. Where possible, the assessment of the data has sought to identify comments with regard to the following characteristics: a) style(s) of approach (effectiveness, inclusivity, flexibility, equitability); b) public participation (degree and quality) / unused capacities; c) collaboration (degree and quality) / appetite for improved forms of governance. Considered together, and in relation to the corresponding sections within Chapter 6, these sub-sections illustrate differences between top-down and bottom-up perspectives, highlight the imbalance in scope and emphasis of approaches to flooding, and note the absence of sound participatory practices and the need for better coordination/co-operation amongst sectors.

Physical aspects

Particularly insightful with respect to humanitarian provisions were emergency management and social workers and several made note of the provision of sandbags and construction materials. Participant 7, an engineer of a provincial water management authority, noted "there is a need for cleaning and a need to guarantee electricity supply with mobile generators. Participant 10, a planner working in provincial government, pointed out that "a mobile hospital/truck is provided for isolated areas". On the whole, however, there was little mention made by professionals and politicians of physical aspects of preparedness for responding to flooding.

Environmental aspects

Participant 21, an engineer working in a provincial water management authority, noted "as a hydrology engineer, I evaluate and monitor water levels". There was, however, little other mention of environmental aspects to preparedness for responding to flooding made by professionals and politicians.

Socio-cultural aspects

Despite the seemingly harsh realities and vulnerabilities for those living in areas with a high level of flood risk, many choose their way of life close to nature with easy access to opportunities for fishing. Understandably, those professionals and politicians working outside the confines of an office and more involved with the community tended to have stronger opinions with regard to the impacts of flooding amongst the poor. This was clearly the case with Participant 41, a head teacher, who worked at a school with pupils who had suffered flooding and recognised that "poor flood victims had shown resilience in facing up to their circumstances". Emergency management workers/trainers working at municipal councils, such as Participant 4 of Fontana and Participant 17 of Barranqueras, mentioned support given through a Plan of Evacuation for Chaco with the latter noting that "voluntary training has been occurring four or five times a year…with help for the community in the construction of houses".

A few of the participants were health workers with a deep understanding of the risks that flooding posed for health in the city region. The interview with Participant 15, a health worker, for example, was particularly illustrative of some of the socio-cultural aspects to preparing for response to flooding events given her involvement in a Ministry of Health (MoH) programme. She noted that the municipal and provincial councils were prepared to contribute boats and that plans were in place to provide community health centres and vehicles. She believed the MoH programme worked well and that, overall, "there was a lot of successful cooperation between different agencies". The interview with Participant 15 is highlighted within Box 5.4 below.

Mention was made by some participants of issues with regard to resourcing of health services and the need for improved approaches to waste management and the cleaning out of drains and sewers. Some suggested a need for improved approaches such as the provision of mobile generators and better preparations for schools and other institutions, such as the responses of Participant 30, an academic of Resistencia and Participant 31, a chemical engineer working in a provincial water management authority. Participant 34, a social worker for the municipal council of Resistencia, noted that "there needs to be a better supply of mineral water during flood events and

provision of water pumps". She believed that "adaptation and appropriate responses were very much dependent on the particular circumstances in question".

Box 5.4 Health Worker
(Participant 15: Female; Interviewed by author on 17th August 2015)

An interview considered illustrative of some of the issues related to preparedness for responding to flooding, particularly in respect to socio-cultural aspects, was that conducted with Participant 15, a health worker (epidemiologist). Her mention of adaptation measures focused, primarily, on a Ministry of Health programme, which she thought had been working well. She noted that community health centres and vehicles were being provided during flooding events and that both the municipal and provincial councils had contributed boats to help with response to flooding and that mattresses had also been provided. The participant was fully involved with the Ministry of Health programme and held responsibility for deciding on how vaccines were to be distributed. She believed that there was a lot of successful cooperation between different agencies. However, she emphasised there was a passivity amongst the general population, and poor take-up of vaccines and a need for better communication with regard to the health risks of flooding.

The epidemiologist clearly had a public health focus in her responses related to the question of flood risk, noting that poor drainage and the dumping of rubbish had contributed to the contamination of lagoons and the re-emergence of several diseases. She mentioned that poor waste management had led to a problem with rats, and diseases affecting the area included leptospirosis, hantavirus, dengue, encephalitis, and West Nile virus, as well as problems caused by spiders, snakes and scorpions and accidents. She saw the community as having social capital and resilience in being accustomed to the experience of flooding and noted that men were staying at home to protect their possessions whilst the women and children were refugees using nearby schools. However, she made the point that problems worsen once flooding subsides to leave standing water (an environment favoured by mosquito culex), and that health problems were exacerbated through people ignoring advice and either preferring to stay in a flooded area or returning to it too soon after the flooding has subsided. However, she noted that the issue of dumping could be contentious amongst the community, with some preferring access to recyclable materials whilst others had been involved in a campaign for better waste management following the death of a girl due to infection.

The participant made no real mention of corruption, and noted that the flood defences were, on the whole, keeping the risk of flooding for the general population down. However, she thought that there needed to be better maintenance of the existing defences, better drainage and waste management and better planning to keep risky flood areas bordering on to lagoons and rivers free of housing. She also believed that more could be done to provide housing settlements in readiness for evacuees from flooding events. Overall, the epidemiologist expressed the need for improved planning and management of the city region and saw better communication of public health messages as a central requirement for improvement to the adaptation of the city region.

However, overall, there was not a great deal of dissatisfaction expressed by the professionals and politicians in respect to socio-cultural measures in preparation for responding to flooding.

Economic aspects

A number of professional and politician responses mentioned a need for more funding to help with preparedness for dealing with flooding. Participant 1, a planner of Resistencia, for example, noted there was a need for both better financial and human resourcing. She believed that "better funding would enable the provision of cameras, computers and vehicles for the work of the planning office… and would enable the coordination of work between the national, provincial and municipal levels of government, with more training and capacity building of staff". A National Highways engineer and his administrative assistant, Participant 28 and Participant 26, respectively, stressed the importance for the economy of preparations to keep traffic flowing on the road network during times of heavy rainfall and flooding. Reference to economic aspects to preparedness of responding to flooding were, however, limited.

Political/institutional aspects

A total of 33 participants (76.7%) referred in their interview to their participation in planning or a water management authority project, programme, collaboration or consultation exercise. Note was made that APA had authority for implementation with regard to the flood risk zones, evaluation and monitoring of water levels, handling both hydrological and meteorological data, and alerting relevant agencies if a flood was imminent and notification of the public through the use of a website, the radio and newspapers. Participant 23, an engineer in a provincial water management authority, Participant 26, a national Highways authority worker, Participant 4 of Fontana and Participant 17 of Barranqueras, both emergency management workers/trainers working at their respective municipal councils, were all informative with regard to political aspects of adaptation. Participant 23 noted that "once a year there are monitoring checks of the defences" and Participant 26 noted "there had been a lot of meetings with people from different organisations…though difficult to sustain". Participant 4 pointed out that "Provincial government (Accion Social) provides new rooves, medicine and clothes". Participant 17 mentioned an interdepartmental group

to deal with crisis that was composed, in part of the Civil Defence, the Emergency Committee and the Public Works department of the municipal council with input from APA, the police, the military, the Civil Defence, the provincial social development department and others. He reported that emergency committees had been meeting infrequently and noted that a "voluntary team meets four or five times a year. Help is provided with construction of temporary shelters".

Reference was made by 7 professionals and politicians (16.3%) to a political and/or legal dimension of social capital and resilience with regard to preparations to responding to flooding. The belief was expressed that there ought to be better facilitation of public participation within the planning system, and more strategic and inter-disciplinary approaches in dealing with preparations to respond to flood risk, especially for those living outside the defences. Participant 23, an engineer in a provincial water management authority, believed "the process for planning was relatively closed and lacking in coordination". Comments were made by some in relation to civic responsibility and the right to land and mention was made of the direct action that the community was making in the blocking of streets to make known its demands. Given the poverty and vulnerability of many within Chaco province, political demonstrations are virtually a daily occurrence in Resistencia city centre, outside the provincial government offices for Chaco, the Casa de Gobierno. Participant 16, a planner of Barranqueras, believed that "more efforts should be made for 'pro-poor' planning with provision of a place and suitable time for inclusive strategic talks with regard to flood prevention".

A total of 5 participants (11.6%) stated that there ought to be more capacity building with regard to the vulnerable poor. Participant 20, an engineer of a provincial water management authority for Chaco province, Participant 30, a research assistant/academic working at a water management authority for Chaco, Participant 38, a teacher and housing worker in Barranqueras and Participant 41, a teacher in Puerto Vilelas, all believed there was a key role to be played by education in helping people to deal with flooding. Given the ageing of many of those with expertise and experience gained in major flooding of the eighties, Participant 25, a water management engineer, considered that "there needs to be further capacity building, fresh approaches to facing future flood risk and greater clarification of roles and

responsibilities for dealing with emergencies with a new protocol for action". Several participants, in fact, expressed frustration that the planning system was, in their view, ineffective and chaotic. Several interviewees expressed the need for greater coordination between the municipal and provincial governments and between the province and the national government, such as Participant 1 and Participant 2, planners of Resistencia and Participant 22 and Participant 25, both engineers of a provincial water management authority. Overall, many participants considered coordination amongst stakeholders to be poor.

iv) Preparedness for recovering from flooding

There can be a broad range of activities for recovering from flooding. Based on the work of Wamsler and Brink (2015), this section is subdivided into themes, i.e. physical, environmental, socio-cultural, economic and political/institutional activities (be they actual/existing or suggested/future activities). Each of these sub-sections forms a summarised record of perceptions of professionals and politicians with regard to the experience of preparing to recover from flooding within the Resistencia city region. Where possible, the assessment of the data has sought to identify comments with regard to the following characteristics: a) style(s) of approach (effectiveness, inclusivity, flexibility, equitability); b) public participation (degree and quality) / unused capacities; c) collaboration (degree and quality) /appetite for improved forms of governance. Considered together, and in relation to the corresponding sections within Chapter 6, these sub-sections illustrate differences between top-down and bottom-up perspectives, highlight the imbalance in scope and emphasis of approaches to flooding, and note the absence of sound participatory practices and the need for better coordination/co-operation amongst sectors.

Physical aspects

Given the flooding in the Resistencia city region following heavy rainfall, as noted above, many interviewees raised issues, such as the collapse of drains and sewers, the contamination of water, and electricity failures and overall disruption to the road network. Whilst a total of 35 participants (81.4%) made reference to physical impacts of flooding on infrastructure and services within their responses, little mention was

made by professional and politicians of physical aspects to preparedness for recovering from flooding. Participant 7, an engineer for the provincial water management authority, did, however, stress "it is important to build sewers and drainage systems prior to paving of streets".

Environmental aspects

Participant 2, a planner of Resistencia municipal council, mentioned the "need for more training to enable a deeper understanding of the environment". However, in general, there was little mention of environmental aspects to preparedness to recover from flooding amongst the responses from the professionals and politicians.

Socio-cultural aspects

Some participant responses did relate to preparedness for recovering from flooding. Participant 5, a town planner of Fontana municipal council, noted that "there are ethnic tensions related to inappropriate building standards for both formal and informal sectors". Participant 22, an engineer of a provincial water management authority for Chaco province, considered there to be "a lack of consciousness with regard to flood risk and the need for a protocol in place prior to a flooding event with roles and responsibilities outlined and for more coordination needed between health and social services". Participant 25, an engineer for a provincial water management authority, noted that "up until 7 years ago there was a collective consciousness regarding major flood events though since then people have become complacent. People are dying because of poor decisions". Others made suggestions that ranged from a need for greater support for the provision of water, latrines and recreation areas for children, and the need for more support for the maintenance of public transport networks. Participant 2, a planner from Resistencia, emphasised the "need for more training to enable a deeper understanding of different cultures"; both Participant 2 and her fellow planner Participant 1 considered there to be a need for awareness raising of the risks involved in living in areas prone to flooding. Participant 41, a head teacher, made particularly relevant comments as she believed "there ought to be an education programme that sought to help provide a more holistic understanding of health and sustainable development". She expressed a belief in the power of education to change the minds of people with regard to the management of the city region and, in referring

to the ideas of the Brazilian philosopher and educationalist Paolo Freire, stressed that "education is the key to improving adaptation to flooding" (see Box 5.5 below).

Box 5.5 Head Teacher
(Participant 41: Female; Interviewed by author on 12th Nov. 2015)

An interview considered illustrative of some of the issues related to preparedness for recovering from flooding, particularly with regard to socio-cultural aspects, was that conducted with Participant 41, a head teacher at a school in an area that has suffered a lot of flooding. Whilst aware of the wider climate-related issues of El Nino which had led to periods of heavy rainfall, the participant believed there to be a lack of consciousness within society to deal with its problems successfully. Understandably, given her role as a head teacher within South America, the participant had been strongly influenced by the pedagogical works of the Brazilian educator and philosopher Paolo Freire, and argued for the need for consciousness-raising programmes to engage the public in more holistic approaches to health and sustainable development.
Rather than an office-based technocrat, she saw herself as someone with an intimate understanding of the challenges facing families that were victims of flooding. She noted there had been a lot of infections amongst the community due to flooding though the poor had shown a great deal of resilience in coping. She did, however, feel that the community was too passive and that there needed to be more participation of the community within the planning for the region. The participant believed there was sufficient space within the city region for everyone to be accommodated safely; however, she felt that the level of corruption in civic life was tantamount to a civil war and the amount and/or quality of public infrastructure works was proving insufficient. Overall, the participant believed that education was the key to improving the adaptation to flooding in the city region.

Economic aspects

As stated above, a number of participants suggested that approaches to planning for the city region ought be more 'pro-poor' and have more of a focus on providing land and secure housing. Four suggestions (9.3%) were made with regard to resourcing issues. Participant 1, a town planner in Resistencia municipal council, stressed that there was "a lack of resources for professionals to do their work" and Participant 13, a politician from Barranqueras, believed there to be "a need for more cooperation with neighbouring Puerto Vilelas…and a need for more resources to help relocate people". Participant 33, a politician/social worker working in Resistencia municipal council, in noting a lack of coordination between different parts of government, stated "there is a need for more economic planning, as well as environmental planning". Participant 35,

an engineer at a water management authority for Chaco province, also noted that "issues with regard to adequate resourcing and implementation are salient ones for the planning system". Overall, however, few comments from professionals and politicians referred to economic aspects of preparedness for recovery from flooding.

Political/institutional aspects

APA has power to remove illegal occupants from flood risk zones based on Law of Resolution (1111) of 1998, there having been close work with consultants from the private sector. A number of professionals and politicians also referred to the recent Resolution 121/2014 to help in controlling the construction of new buildings and to help in avoiding detrimental impacts upon drainage. A total of 10 participants (23.3%), however, noted the lack of participation in planning processes and/or the need for more participation. Participant 25 and Participant 27, both engineers of a water management authority for Chaco province, wanted greater public participation in planning, as did Participant 29, a politician based in Resistencia. Participant 23, an engineer in a provincial water management authority, believed "the planning process is closed in nature and…I would like more involvement in it myself". Participant 32, a politician/planner working for the provincial government for Chaco, also believed there was a "need for a more 'pro-poor' focus in policy". Participant 38, a teacher/housing worker at a school in Barranqueras, believed that "schools play a vital role during a flooding event… there is a need for a programme of capacity building for the community"; similar views were also expressed by Participant 41, a teacher/school director of Puerto Vilelas.

Participant 19, a politician and leader of a local political party, stressed that "there is a lot of corruption in public life, with government using flooding to its advantage for financial gain….the supposed planning system is, in fact, anarchic". Participant 9, a social worker for the provincial government, also said there were "a lot of jealousies and corruption in public life". Participant 20, a key engineer at the provincial water management authority for Chaco, also noted that "political affiliation can have a significant bearing on city management"; Participant 7, an engineer in the water management authority for Chaco province, expressed a similar view. Political/corruption issues were, in fact, mentioned by 9 participants (20.9%).

Participant 21, an engineer for the provincial water management authority, noted that "control of government is poor, with politicians going over the heads of planners".

A total of 27 participants (62.8%), however, did make responses that were related in some way to managerial or strategic issues or suggestions. Several were quite clear in stressing the need for greater coordination and collaboration between different stakeholders. Participant 22, an engineer in a provincial water management authority for Chaco province, believed "there is a need for establishment of a protocol to be in place prior to a flooding event with outlined roles and responsibilities…and there is a need for more coordination between health and social services". Participant 6, an engineer/water management worker at Resistencia municipal council, also believed "there is a need for a protocol with regard to flooding and better communication". Poor communication was an issue also raised by Participant 15, an epidemiologist for the provincial government. Participant 16, a town planner in Barranqueras municipal council, believed "there is a need for better planning and collaboration", and Participant 13, a politician at the municipal council of Barranqueras, believed there to be "a need for more cooperation with neighbouring Puerto Vilelas". Participant 17, an emergency management worker in the municipal council of Barranqueras, believed there is "a need for improved planning with a longer-term view". Likewise, Participant 18, a politician in the municipal council of Puerto Vilelas, believed there to be "a need for improved strategic planning with better coordination between national and provincial government". Participant 28, an engineer of the national Highways agency, also noted "a lack of coordination between different organisations". Participant 26, an administrator of the national Highways agency, mentioned "a need for collaboration of different organisations". Similarly, Participant 27, an engineer in the provincial water management authority for Chaco province, believed that "planning for the city region should involve the introduction of varied roles, such as sociologists and psychologists, as ageing experienced professionals are replaced". Participant 21, an engineer for a water management authority for Chaco province, also believed that "planning in the future ought to have a more teamwork-oriented approach". Participant 30, a research assistant/academic working in a water management authority for Chaco province, believed "the planning process is too slow and reactive…there is a need for teams, comprising people of different professional disciplines, to work together". Participant 29, a politician working in the provincial government for Chaco,

mentioned the need for better alert systems and also stressed the need for better planning and better communication as did Participant 32, a politician/planner, working provincial government for Chaco, who wished to see greater coordination between authorities. Participant 33, a politician/social worker working in the municipal council of Resistencia also remarked upon the lack of coordination between different parts of government, as did Participant 34, a social worker in the municipal council of Resistencia. Participant 39 and Participant 42, both health workers, in Barranqueras and Puerto Villelas, respectively, believed there was a need for a longer-term vision. However, Participant 24, a lawyer working in a provincial water management authority for Chaco province, was adamant, however, that "the example of the system of defences for the Resistencia city region is a good one that is very informative for other regions" - a view shared by Participant 43, a senior engineer working in the same organisation.

In summary, there appears to be a focus on physically-oriented adaptation measures amongst professionals and politicians that tends to overlook issues for the vulnerable poor and often places blame on them. The next chapter moves on to explore the views of poor flood victims.

CHAPTER 6

Poor flood victims: How was it for you?

When seeking to acquire a more holistic understanding of how to plan and manage a city region prone to flooding with a variety of socio-economic, environmental and political factors that can have a bearing on flood risk and the hazards experienced, the perspectives of poor flood victims themselves can be of great value. There are potentially many ways in which people could be engaged in a city region with varying degrees of formality; however, in practice, constraints can hinder grassroots voices being heard (Cleaver, 2001; Howell and Pearce, 2001). Physical, environmental, socio-cultural, economic and political constraints can all limit the opportunities for grassroots communities to influence efforts at coping and adaptation. This study has gathered the views of poor flood victims (PFV) in the hope that account can be taken of them in forming and/or implementing relevant and suitable policies for the Resistencia city region.

This chapter provides the results of the Phase 2 data collection conducted between March 2016 and August 2016 in the Resistencia city region involving interviews with members of the community who had experience of flooding at their homes. Semi-structured interviews were conducted with poor flood victims from the four main localities of the metropolitan area of Gran Resistencia (AMGR), namely Resistencia, Barranqueras, Fontana and Puerto Vilelas, along with a number conducted with people who lived closer to the banks of the River Paraná in the neighbouring areas of Antequeras, Barrio San Pedro Pescador and Isla del Cerrito (see Figure 4.1). Also, a couple of elderly participants shared their recollections of huge flooding events in the past. In total, 49 flood victims were chosen for interview with 24 of them female and 25 male and the research sample comprised a spread of people from across the city, as follows: 14 participants from Resistencia; 12 participants from Barranqueras; 3 from Puerto Vilelas; 7 participants from Fontana; 7 participants from Antequeras; 5 participants from Barrio San Pedro Pescador; and 1 participant from Isla del Cerrito. Some of those interviewed were employed in various forms of informal and domestic

work though only 1 (2%) of the 49 participants interviewed had work directly within a provincial water management authority. Poverty in the area was clearly apparent, and whilst many of the interviews took place at a home that had been recently flooded, others were conducted at temporary houses constructed on higher ground or within the central plaza within Resistencia with people sharing their insights following their displacement.

As with the previous phase of data collection, the interviews were conducted with the help of bi-lingual assistants, who had been briefed about the research aims and provided with a guide for the questioning (See Table 3.1 in Chapter 3). Once consent was given by the participants, the interviews were conducted in a semi-structured way such that the participants had flexibility to freely express their views; however, attempts were made to guide responses so that insights could be gleaned on the risks and impact of flooding, adaptation measures made and perspectives on governmental approaches, especially with respect to their impact upon the lives of the poor within the city region. The qualitative data collected in Phase 2 were transcribed and checked for accuracy ready for analysis, and are presented below, in summarised form, using the same framework as that used to present the data in the previous chapter (see Table 5.2). As such, the summarised findings are structured into the following four categorisations: i) reduction and avoidance of flooding hazards; ii) reduction of vulnerability to flooding; iii) preparedness for responding to flooding; or iv) preparedness for recovering from flooding. As was done in chapter 5, each of these categories is sub-divided further into physical, environmental, socio-cultural, economic and political/institutional aspects so that key themes could be more easily identified from the range of perceptions in relation to coping and adaptation measures. A number of boxes are also interspersed within the text to provide a further focus on interviews that were considered particularly illustrative of the issues involved.

In the early weeks of 2019, rainfall affecting the north east of Argentina and neighbouring parts of Paraguay, Uruguay and Brasil far exceeded expected levels and serious flooding affected the province of Chaco, including the Resistencia city region, and a state of emergency was declared (Norte, 2019). Thousands of people were evacuated and, as well as the immediate social impacts, millions of hectares of farmland were submerged and, for a nation already plagued with one of the highest

rates of inflation in the world, it was forecast that the loss to the economy could reach US$2 billion (Buenos Aries Times, 2019). During the course of this research, many people also had to adapt to a new reality when serious flooding occurred to much of the Antequeras area to the east of the city region between December 2015 and March 2016 due to the rise in the level of the River Paraná. As such, experience of flooding was fresh in the minds of all those interviewed, and many passionate views were espoused. All of the 49 poor flood victims (100%) made responses that related in some way to perception of risk, and all 49 (100%) made responses that related in some way to adaptation measures. Many poor flood victims believed climate change and the El Niño phenomenon were increasing the intensity and frequency of heavy rains, and their responses reflected a general disappointment in the role being played by national, regional and local government in addressing issues of flooding. In fact, a total of 39 poor flood victims (79.6%) referred to issues of city planning/management as being a cause of flood risk within their responses. Also, a total of 46 participants (93.9%) expressed various degrees of concern at the perceived corruption at work within local government. Critical comments ranged from concern over the local government approach to flooding to disappointment in the widespread nature of corruption in the country in general to the highlighting of examples of criminal and/or corrupt activities within the Resistencia city region.

Overall, the distillation of the collated Phase 2 data reveals a picture that is at odds with those of city authorities presented within the previous Chapter 5. The responses of the poor flood victims (PFV) tended, on the whole, to more strongly reflect an urgent need and desire for more measures to reduce vulnerability. There was, in general, considerable disappointment amongst poor flood victims with the role played by local government, a desire amongst them for more genuine opportunities for engagement in the planning of the area and, given a perceived lack of coordination and/or attention of various stakeholders, a sense that the poor had little choice but to respond to flooding themselves. The following sections highlight the themes that emerged and, having grouped responses in the same way as those of the professionals and politicians, comparison of the views presented here in this chapter with those presented in the previous chapter informs the analysis and discussion in Chapter 7.

i) Reduction and avoidance of flooding hazards

This category concerns perceptions of strategies and measures for reduction and avoidance of existing or future flooding hazards. In theory, there can be a broad range of such strategies and measures and so, based on the work of Wamsler and Brink (2015), this section is subdivided into five aspects of strategies and measures, i.e. physical, environmental, socio-cultural, economic and political/institutional aspects, be they actual/existing or suggested/future strategies and measures. Each of these sub-sections forms a summarised record of poor flood victims with regard to the experience of reducing and avoiding flooding within the Resistencia city region. Where possible, the assessment of the data has sought to identify comments with regard to the following characteristics: a) style(s) of approach (effectiveness, inclusivity, flexibility, equitability); b) public participation (degree and quality) and unused capacities; c) collaboration (degree and quality) and appetite for improved forms of governance. Considered together, and in relation to the corresponding sections within Chapter 5, these sub-sections illustrate differences between top-down and bottom-up perspectives, highlight the imbalance in scope and emphasis of approaches to flooding, and note the absence of sound participatory practices and the need for better coordination/co-operation amongst sectors. It is clearly apparent from the findings that the problems and vulnerabilities of the poor have been going unrecognised by city authorities. Despite the efforts of the poor to find their own solutions, the system seems to have constrained them and limited their ability to respond. The findings show there is an overall perception that opportunities for public engagement of the poor in formal adaptation measures have been limited in scope and quality, whilst the politics of corruption and patronage have meant the poor have continued to suffer at the hands of the rich and connected.

Physical aspects

During times of heavy rainfall, vast areas of the Resistencia city region can become flooded and, with streets having been periodically and/or episodically like rivers, many participants mentioned physical impacts upon their homes and upon infrastructure. PFV Participant 15 of Barrio San Pedro Pescador said she had "experienced significant flooding to the house three times already this year". PFV Participant 39, an elderly resident of Barranqueras, noted that "flooding has been a

continual problem for many years… recently I lost all of my possessions when flood waters entered the house and the walls became damp". PFV Participant 48 of Resistencia said "We have been awaiting a new tube system project that was supposedly to be undertaken by the regional water management organisation for the neighbourhood. A recent flooding event flooded a septic tank and led to the spread of contaminated waters….Water enters the house several times a year". Communication, services and transport have also been frequently affected at times of flooding, with holes in the road and the cutting-off of routes leading to accidents and restricted access. PFV Participant 28 of Barranqueras made particular note of the impact of services in his neighbourhood when flooded remarking that "there were no lights in the street and no buses".

Urban authorities could, in theory, take a range of physical measures to reduce and avoid flooding hazards such as the building of flood defences, dikes, flood walls and dams beyond the limits of a city, and the relocation of key infrastructure such as schools, hospitals and other civic buildings. The Resistencia city region does, indeed, have many years of experience in attempting to address flooding through these kinds of physical adaptation measures, from minor earthworks and modest constructions upon stilts to huge engineering projects involving the system of defences and pumping stations. In fact, a total of 38 participants (77.6%) referred to existing physical adaptation measures in their responses. Several interviewees mentioned the system of defences and pumps that were built around the city to protect it from river flooding. However, rather than all of them celebrating the existing defences and pumping stations to reduce hazard, a high proportion of responses expressed frustration at the failure of such measures to prevent flooding of homes. Corruption was referred to often throughout the interviews (and noted frequently within this results chapter). However, whether or not corruption was considered as playing a part, it was striking that there seemed to be a major gap in perceptions of the efficacy of the regional flood defence and pump station system between the perceptions of professionals and politicians and those of poor flood victims, that represented a huge problem area. PFV Participant 35 of Resistencia, for example, mentioned there was "a need for government to maintain the existing defences". PFV Participant 22, also of Resistencia, noted that "the pumps around the city were not working properly and this has contributed to flooding" and PFV Participant 43 of Barranqueras noted that "traffic

driving upon the nearby defences is affecting the strength of them". PFV Participant 15 of Barrio San Pedro Pescador noted that "a new defence was being built here within the Paraná river, though this was halted with the change of government".

Citizens themselves can take a range of physical measures to reduce and avoid flood hazard such as innovative use of local materials for adaptation measures and using the labour of local unemployed people. Indeed, most responses for this category related to physical measures taken to reduce and avoid flooding hazards by flood victims themselves within their neighbourhoods, such as acquisition of land, the construction of makeshift homes at the side of the road, the building of a higher part to the house at the rear or the raising of floor levels. PFV Participant 43 of Barranqueras noted his own resilient approach in saying "I used my previous construction experience to construct the house over the drainage pipe that diverts rainwaters from the area". Several participants spoke of the lifting of their possessions to reduce the risk of damage and some said they sought to raise floor levels within their house and/or yard as and when they could. PFV Participant 34 of Fontana, for example, said "I had to move furniture and the television higher and/or away from walls to avoid flooding/damp". PFV Participant 48 of Resistencia mentioned that "belongings in my house, such as the washing machine, refrigerator and furniture, have been raised so as to be above flood waters. I placed a sandbag in the drain of the shower to try and stop water coming in and I often thoroughly clean/disinfect the house and yard". In contrast to the view of the professionals and politicians, there was an overall perception amongst poor flood victims that regional engineering projects were not adequate and that measures at the household level were essential to try and minimise the impact of flooding.

As well as comments received with regard to existing physical adaptation measures, a total of 32 participants (65.3%) made suggestions for physical adaptation measures within their responses. Many expressed a wish for a more responsible approach on the part of local government to cleaning and maintenance and improvement of road surfaces. A few respondents had the perception that there was a need for another defence and further engineering to divert waters or infill lagoons, such as PFV Participant 45 of Puerto Vilelas, for example, who considered "the river is the main threat with regard to flooding". Others stressed the view that there ought to be further

infrastructure of drains, pumps and sewers or improvement to the existing pumps, such as PFV Participant 46 of Resistencia who thought “there needs to be bigger drains in the street”. A number of participants believed there was a need for housing projects with stilts, floating foundations or upon land that was at less risk of flooding. As well as wanting the government to take a more responsible approach and raise land levels and divert waters, PFV Participant 32 of Barranqueras, for example, felt “there needed to be more of a focus on house building and the provision of building materials”. A few participants also made suggestions in relation to improvement of road surfaces with stones and the infilling of holes such as PFV Participant 42 of Resistencia who said “at times it is chaotic”. In general, it was clear that many interviewees felt there was a need for better maintenance of existing infrastructure to optimise its functionality and, consequently, felt a need to make physical adaptation measures themselves.

Environmental aspects

A high proportion of responses showed general awareness about the environment, with many participants referring to causes for flooding as being the local rains, flooding from the rivers Paraná and Negro and the interconnected system of lagoons that dotted the area**.** A number of participants mentioned that the natural geomorphology and hydrology of the city region were leading to slow drainage because of the low-lying nature of the area, the shallow gradients of the river basin and the high-water table. PFV Participant 16, PFV Participant 17 and PFV Participant 48, for example, all of whom were from Resistencia, considered the high risk of flooding for Chaco was, in part, due to the area being a low-lying basin with a lack of gradient in the terrain. PFV Participant 17 of Resistencia noted how “the combination of the low-lying nature of the area, heavy rain and water rising in lagoons caused continual flooding”. PFV Participant 23 of Resistencia also noted “the city is low-lying, with dirty lagoons and drains that lead to a continual risk of flooding...the need to clean rivers, lagoons and drains ought to be a priority”. PFV Participant 46 of Resistencia made similar points noting how “the complex situation with the lagoons, along with rubbish blocking drains, has contributed to contaminated water entering the house”. PFV Participant 49 of Resistencia, who lived on low-lying land by an ecologically valuable lagoon, said “the lagoon is cleaned infrequently, and the house

floods on up to eight occasions a year, perhaps for a week at a time. Flooding causes movement in creatures, such as insects, big spiders and frogs…and mosquitoes are a problem". PFV Participant 12 of Fontana mentioned that "camalote (water hyacinth) blocks the drains". A few participants saw flooding as being part of a natural cycle such as PFV Participant 34 of Fontana, who noted that "flooding happens several times a year…there is a greater risk of flooding in summer". PFV Participant 8 of Barrio San Pedro Pescador, who had moved to the area because of major flooding in 1982, considered that "flooding is a part of the cycle of life…though people do not want to leave the area when they are older…and I am concerned over the welfare of animals". Many participants attributed flooding to some degree to the El Niño phenomenon, such as PFV Participant 16, PFV Participant 42 and PFV Participant 48 of Resistencia, and PFV Participant 33 and PFV Participant 38 from Barranqueras. In fact, there was a feeling amongst many that causes outside the region were leading to a continual risk of flooding, with a total of 39 participants (79.6%) having referred to international/global causes of flooding in the city region in their responses. A few of the participants attributed flooding in the city region, in part at least, to deforestation in Brasil such as PFV Participant 13 of Fontana and PFV Participant 26 from Resistencia who noted "the impact of deforestation in the entire region". Flooding was also attributed, in part at least, to the release of waters upstream of the Paraná river at the Itaipu and Yacyretá (by PFV Participant 2 from Resistencia**,** PFV Participant 3, PFV Participant 4, PFV Participant 10 and PFV Participant 11 of Antequeras, PFV Participant 30 and PFV Participant 44 of Puerto Vilelas and PFV Participant 7 of Barrio San Pedro Pescador). PFV Participant 25 and PFV Participant 43 of Barranqueras noted the effect of the dams and the latter, as a former fisherman, believed that "since the building of dams, fish have become smaller and there are less of them". PFV Participant 10 of Antequeras noted that "dams have affected the local ecology…there are less fish and, along with the impact of climate change, flooding has become bigger and more frequent". Many of the participants believed the climate was changing, such as PFV Participant 15 from Barrio San Pedro Pescador and Participant 1 of Resistencia, for example, with the latter stating that "the frequency of heavy rainfall has increased".

Even though a high proportion of responses showed considerable environmental awareness, there was, in fact, very little comment made in relation to environmental measures being made to reduce and avoid hazard. PFV Participant 22 of Resistencia stressed "there is a need for us to take care of our environment" and PFV Participant 39 of Barranqueras was of the view that "the government lacks environmental consciousness". PFV Participant 46 from Resistencia mentioned that "the government is not doing anything with regard to climate change…there is a need for education programmes with regard to environmental management". Urban authorities could, in theory, seek to reduce and avoid flooding hazards through a range of environmental measures such as tree planting programmes and renaturalisation of the rivers, wetlands and lagoons, which could have ecological benefits and help contribute to social cohesion and public health. However, the interviewees made little or no mention of such practices.

Socio-cultural aspects

Whether people wish to live close to nature, or feel compelled to, residing in hazardous locations is bound to have its inherent risk, and citizens could, in theory, take a range of socio-cultural measures to reduce and avoid flooding hazard. PFV Participant 26 of Resistencia recollected staying with a classmate and PFV Participant 48 of Resistencia said that "my grandchildren, who had been living with me, moved to the house of their other grandmother due to recent flooding". The importance of a communitarian perspective of mutual help amongst interviewees was clear. Given their experience, it is perhaps unsurprising that a total of 48 participants (98%) made responses that related in some respect to social capital and resilience, and the plentiful social-cultural insights provided by poor flood victims tended to stress the importance of mutual help in relation to various matters. PFV Participant 1 of Resistencia noted that "people are accustomed to living with flooding…there is a lot of cooperation between family, neighbours and faith groups". PFV Participant 5 of Antequeras also believed "there is a strong sense of community between neighbours". PFV Participant 40 of Barranqueras, who had young children, noted that "I have lived in the house all my life and I have suffered flooding throughout that time. I consider the neighbourhood to be close-knit though". PFV Participant 44 of Puerto Vilelas said "I am originally from the area and accustomed to the lifestyle with its helpful and charitable

community…however, government help is minimal". PFV Participant 6 from Antequeras also believed "there is a strong sense of community between neighbours…humble fishing people living within their own environment". PFV Participant 11, also from Antequeras, said that "as a retiree, I enjoy the tranquillity and the cooperative community spirit of the area. However, despite the provision of a Ministry of Health mobile centre nearby, I feel that there is not enough help from the government". PFV Participant 10 of Antequeras noted that "people living near the river are accustomed to the lifestyle and the tranquility…the community are charitable. Mineral water, clothes and shopping were given out though the distribution of assistance is poor". PFV Participant 24 of Isla Cerrito also felt that "the government does not help much at time of flooding". Overall, the interviews tended to reveal that poor flood victims were both preoccupied with day-to-day livelihood strategies and bewildered at the lack of assistance from the authorities with responsibilities for the city region.

A number of responses suggested there was the need for environmental consciousness raising and environmental, social and cultural education programmes. Both PFV Participant 36 of Barranqueras and Participant 16 of Resistencia believed authorities ought to promote the maintenance of cleanliness of streets. Various kinds of promotion, information provision and campaigns could, in theory, be undertaken by city authorities to reduce and avoid flooding hazard, such as various kinds of risk awareness raising exercises or targeted actions for identifying adaptive capacities of those at risk. However, there was little or no mention of such measures being in existence; rather, they were suggested as potential solutions to the flooding problems.

Economic aspects

PFV Participant 34 of Fontana mentioned that "I want to build up the levels on this site and put more earth by the adjacent lagoon, though I cannot afford the materials", and PFV Participant 40 from Barranqueras said "I aim to raise the floor level in the house when I have enough money". PFV Participant 46 of Resistencia mentioned "I occupied this house as it was abandoned and dilapidated and have only been making prudent, cautious investment to it in case the owner re-emerges". PFV Participant 11 of Antequeras mentioned "there is a lack of financial capital amongst the people…the

community here are accustomed to the situation and to living humbly…however, without the capital to have alternative housing, there is a degree of resignation amongst the community". PFV Participant 43 of Barranqueras believed "the government provides minimal assistance to the neighbourhood at times of flooding, such as metal roofing materials and a bit of food. Without having much capital, vulnerable people are unable to buy a house and have little choice other than to build their own…the government cares little for those living outside the city region defences". Economic measures to reduce and avoid flooding hazards could, in theory, be taken by urban authorities such as incentivising vulnerable people to move to areas that are lower risk through the use of tax inducements; however, there was no mention of such measures. Instead, as noted in the introduction, the issues of under-resourcing and corruption were mentioned often.

Political/institutional aspects

Whilst the importance of day-to-day pressing matters was noted by many participants, an overriding sentiment that also came out of the interviews was that the city region suffered on account of the perceived inadequacy of the systems for planning and management. Various political/institutional measures could, in theory, be taken by urban authorities to reduce and avoid flooding hazards through ensuring that relevant policies, structures and mechanisms are in place, such as land use planning (including through the use of hazard mapping) and its robust enforcement to keep risky areas free of development. Also, efforts could be made to ensure various organisations/institutions and stakeholders collaborate effectively and that the general public are engaged in such measures. However, many poor flood victims believed that the reality for the Resistencia city region was one in which government approaches to flooding were lacking in sound strategy, merely reactionary or incompetent or, worse still, extremely corrupt. Furthermore, many participants expressed the view that opportunities to engage with planning processes were limited in scope and quality or simply non-existent.

PFV Participant 19 of Barrio San Pedro Pescador believed "there is a big distance between the government and the people and there is no plan for the neighbourhood. There is a need for a community resource centre built on stilts and I would like to be

involved in designing such a facility". He said, more generally, that "I would like to be involved in a participatory planning process…there is a need for the government to listen to people. However, I have not received an invitation to be involved in planning previously and, in reality, government help to deal with flooding is minimal". PFV Participant 1 of Resistencia said "I took part in a consultation exercise four years ago though the government took no consequent action…the government is in a bubble…there is a need for the government to listen to the people more". PFV Participant 48 of Resistencia said "I would like to participate/share opinions in the planning system. Fifteen people did meet a local government representative in the street; however, more cleaning of the street tended to occur around election time…I am waiting for more action. There are significant administrative delays in local bureaucracy and I do not expect the new government to make much difference". PFV Participant 42 of Resistencia, who was very visible within the neighbourhood given that she sold food in front of her house, said "Nepotism is rife…some are helped more than others if they have relevant contacts. Monies received from national government for addressing flooding are not being distributed appropriately…Stones ought to be used to improve the road surface, however the government makes promises though accomplishes nothing. I spoke to government representatives with regard to improving the neighbourhood though nothing was done. I do not have time to keep making representations to local government though I am loyal to the area and would like to participate in planning of the neighbourhood if given the opportunity".

Corruption did seem to be a very prominent issue for Chaco and so it had been placed within the semi-structured interview guide as a matter that warranted closer scrutiny. Many participants expressed concerns related to corruption which was considered a widespread problem for the region and, indeed, the whole of Argentina. Despite his election campaign stressing that tackling corruption would be a priority, not many participants held out hope that President Macri, elected in late 2015, would make any major change to widespread corruption. In fact, a total of 45 (91.8%) participants, expressed various degrees of concern at the perceived corruption at work, with government considered as having too great a focus on the furthering of commercial interests of big business and being corrupt in such dealings. PFV Participant 13 of Fontana, for example, thought "there is serious corruption with money not being spent properly… Despite the need for insfrastructure, the planning of the area is bad".

Several participants believed that supposed attempts at addressing flooding were cosmetic or theatrical exercises whereby local politicians were cynically using the situation of flooding to attract funding from national government, and that those monies were not getting to the recipients intended. Responses noted that monies were being stolen by government or community intermediaries through people being paid to keep silent and/or through monies being spent on matters other than the addressing of the flooding problems for which the monies were originally allocated.

A total of 41 (83.7%) of the participants referred in their interview to participation in planning or a water management authority project, programme, collaboration or consultation exercise. Despite the negative perception that many had of the approach to reducing hazard in the city region, it was striking, in fact, that many of those people expressed a wish for their opinions to be heard and to participate in the planning system in some way themselves. PFV Participant 40, who lived in Barranqueras with her young children, noted "I have lived in this house all my life and suffered flooding throughout that time…I would like to participate in planning of the neighbourhood". PFV Participant 39 of Barranqueras had lived in her house for fifty years and said that "my very elderly mother went to live at the house of her other daughter during a recent period of flooding…the government did not help much, and funding received by the government was not distributed appropriately. I was only provided with two bags of sand to face up to ingress of water and snakes". Despite her dismay at the level of corruption in the area, she did consider that "planning is very important…the government needs to see what vulnerable people need. I have many years of experience of living with flooding…I would like to contribute to the planning of the neighbourhood; however, to date, I have not been invited to participate". The insights gleaned from PFV Participant 26 of Resistencia were particularly relevant to some of the issues raised in this section and are expanded further in Box 6.1 below.

Box 6.1 Poor flood victim of Resistencia

(Participant 26: Male; Interview with author on 21st May 2016)

An interview considered illustrative of some of the issues related to reduction and avoidance of flooding hazard, particularly in respect to political aspects, was that conducted with PFV Participant 26, a flood victim of Resistencia. This participant moved to the city region for work and study, an experience he believed was shared by many migrants from the interior as they sought improved economic stability and/or pursued further education. He believed that currently up to 70% of the population of Resistencia lived in informal housing and, given their circumstances and experience of flooding, the participant considered there was a lack of medical services in the neighbourhood and little interest shown by a government that he believed had rather regressive ideas.

The participant attributed flooding in the area to heavy rainfall and deforestation throughout the entire region and noted that households were affected in numerous ways including the onset of colds, fever and respiratory diseases, and dangers encountered due to movement of big and poisonous snakes and ants. Rather than keeping pace with growth in the urban population and the risks to health experienced at the periphery of the city region, he believed the government was more focused upon development of the city centre with links to capitalist/commercial interests. In fact, he thought there was little evidence of planning for the city region and despite seeing the government as being repressive and controlling of the media, he thought it was clearly apparent that there was likely to be much more flooding there in the future.

Rather than just await government assistance, he mentioned that neighbours were working together in numerous ways to help each other become established in the area. He had become actively involved in organising political strategies with students in 3rd level education and during a recent flooding event, he went to live in a spare room of a classmate. He noted that people in informal settlements tended to send their children away at times of flooding and mentioned that students, workers and the unemployed had recently blocked traffic in a nearby avenue for 2 days to bring attention to their plight. He was involved with a political organisation that had a strong presence in the community and that had builders working with and for the community. In return for his activism, he had been helped with the provision of a house and work had started on the building of a further new home on land to the rear of his house using materials provided by a government housing institution.

The participant had been influenced by the ideas of the Brazilian philosopher and educationalist Paolo Freire and very much believed in the power of education to change the minds of people with regard to the management of the city. It was clear for him that planning and adaptation to flooding was not just a matter for engineers and formal authorities. Indeed, not only did he see a need for greater attention and resources for planning processes, he believed there ought to be much more engagement of the public, even to the extent of the community having budgetary control. In his view, given the corruption and/or disinterest of government in the plight of the vulnerable, it was very much the case that members of the community needed to look after one another.

ii) Reduction of vulnerability to flooding

This category concerns perceptions of strategies and measures for reduction of vulnerability to flooding. There can be a broad range of such activities and so, based on the work of Wamsler and Brink (2015), this section is subdivided into themes, i.e. physical, environmental, socio-cultural, economic and political/institutional activities (be they actual/existing or suggested/future activities). Each of these sub-sections forms a summarised record of perceptions of poor flood victims with regard to the experience of reducing vulnerability to flooding within the Resistencia city region. Where possible the assessment of the data has sought to identify comments with regard to the following characteristics: a) style(s) of approach (effectiveness, inclusivity, flexibility, equitability); b) public participation (degree and quality) / unused capacities; c) collaboration (degree and quality) / appetite for improved forms of governance. Considered together, and in relation to the corresponding sections within Chapter 6, these sub-sections illustrate differences between top-down and bottom-up perspectives, highlight the imbalance in scope and emphasis of approaches to flooding, and note the absence of sound participatory practices and the need for better coordination/co-operation amongst sectors.

Physical aspects

Many residential streets in the Gran Resistencia city region suffer during times of heavy rainfall and a total of 42 poor flood victims (85.7%) referred in some way to the impacts of flooding upon infrastructure and services within their responses. Mention was made of the street being like a river and that access was restricted due to the cutting off of routes. PFV Participant 41 of Fontana, for example, noted that "the street is full of holes and, at times of flooding, water supply, electricity and street lighting can be affected and there may be difficulty in acquiring cooking ingredients for my business". She noted that "the medical facility nearby had limited opening hours and the floods had led to flu and the children developed skin conditions". PFV Participant 27 of Barranqueras thought "the engineered solutions are poor and water entered the house frequently with, perhaps sixty days of the year when water in the house lies at a depth of half a metre. Some people in the neighbourhood went to stay with relatives when flooding occured, however I stayed on in the house. There are cuts in electricity,

and for several days there can be effects on access to drinking water…There is complacency amongst engineers with regard to the effectiveness of the defences and pumps". PFV Participant 42 of Resistencia noted that "at times of flooding, electricity cut outs led to problems with refrigeration and air conditioning". PFV Participant 7 of Barrio San Pedro Pescador noted that "flooding impacts upon the sewerage system and there can be a lack of potable water". PFV Participant 40 from Barranqueras noted that "flooding has been worse recently…there is a continual risk of it…and there have been cuts in street lighting. During a recent flooding event, the flooding was made worse through run-off from the property of a neighbour. I bought cleaning materials to clean-up after the flooding of the house which occurred during Christmas and New Year, and my brother gave me a pump to help alleviate the situation". Problems with waters diverting from one neighbourhood to another or from a house to another neighbouring one was, in fact, mentioned by a number of participants including PFV Participant 13 of Fontana who said "when it rains, the water comes in from other barrios".

Several poor flood victims, then, considered that the existing physical infrastructure was ineffective and led to inequities in outcome. Urban authorities could, in theory, reduce vulnerability to flooding through undertaking works to improve the systems for drainage and sewage and enhancement of highways, for example. However, many participants mentioned that the system of defences and pumps was not working adequately and so many believed that flooding of their streets and neighbourhoods was due, in part, to the way in which the area was planned and managed. In fact, a total of 39 poor flood victims (79.6%) referred to issues related to the way in which the city region was planned and/or managed as being a cause of flood risk within their responses; the greatest number of such participant responses attributed the flooding of streets to the limited extent, size or overwhelming of, the drainage and sewerage systems. PFV Participant 23 of Resistencia, for example, believed "the situation with the drains and the lack of cleaning of them has led to a continual risk of flooding". PFV Participant 29 of Barranqueras remarked that "heavy rainfall is disastrous for the neighbourhood as the flood drains do not function well and water becomes contaminated". PFV Participant 12 of Fontana believed "there would be improvement if there was a programme to provide a better drainage system along with greater efforts to keep them clean". Issues with pumps for the neighbourhood were raised, and PFV

Participant 36 of Barranqueras noted that "traffic from the local factory has been damaging the road and affecting the drainage…and when the pumps are not working well there is a bad smell". PFV Participant 47 of Resistencia also spoke of a "need for a bigger and better drainage system and a need for drains to be kept clean". PFV Participant 39 of Barranqueras saw that "there is a need to make regular cleaning of the drainage system, from rubbish such as plastic bottles, a priority. The government has been more helpful in the past…the current municipal government is incompetent". PFV Participant 17 from Resistencia also noted "there is a need to maintain and clean the drainage system. The government has a very irresponsible approach…corruption manifests itself in terms of money having been taken for projects that were not then completed properly".

Whilst many poor flood victims mentioned the extensive engineering works around the city within their responses, they tended to report a need to take informal physical measures to reduce their vulnerability, and were focused in their responses more upon homespun measures at the neighbourhood and household levels. PFV Participant 46 of Resistencia was amongst those respondents who had remained in her flooded neighbourhood and she mentioned that "occasionally I clean rubbish out of drains in the street myself". PFV Participant 27 of Barranqueras said "a stockpile of wood is kept in front of the house that is shared by neighbours for raising furniture when flooding was imminent…When the flooding of the house occurred, I continued to do housework with boots on". PFV Participant 47 of Resistencia, who had moved to the area from Buenos Aries, noted that "the frequency of flooding has increased…I have to disinfect the house frequently with the flood waters having come up through drains into the bathroom. I lifted things of value up higher within the house and am working incrementally at raising the floor level". The opening of a channel by a government representative to aid in deflecting the flow waters from a hazardous neighbourhood by a lagoon was a rare positive example of a municipal physical measure to respond to an immediate flood problem noted by PFV Participant 41 of Fontana. She noted, however, that "damp rose up from the water table…the newly built house is damp. When there is heavy rainfall, I have to move and/or raise furniture and unplug electric appliances such as the television". PFV Participant 45 of Puerto Vilelas believed "there needs to be another river defence. I had raised stuff up in the house as a precaution; however, during the most recent flooding event, damp affected the couch

and television, the street was cut-off and creatures, such as ants and frogs, entered the house". The interview with PFV Participant 36 of Barranqueras was particularly informative with respect to physical aspects of reducing vulnerability to flooding (see Box 6.2).

Box 6.2 Poor flood victim of Barranqueras
(Participant 36: Male; Interview with author on 23rd June 2016)

An interview considered illustrative of some of the issues related to reduction of vulnerability to flooding, particularly in respect to physical aspects, was that conducted with Participant 36, a flood victim of Barranqueras. The elderly resident mentioned that flooding was leading to cases of flu, lung disease, allergies and problems with mosquitoes and rats and that there was a bad smell when pumps for draining the area were not working properly. In general, he thought that neighbours were very helpful to each other during a flooding event and a local community organisation had helped with funding to purchase materials. So, he bought new materials and had been working incrementally to improve the house through raising/improving the floor. He had also been provided with sandbags by the local government and used rat traps to deal with the vermin issue.
The participant acknowledged that the climate was changing and heavy rainfall was leading to flooding, however he considered a primary reason for disruption to the neighbourhood was damage to, and clogging up of, the drainage system in the street. He stated that traffic from the nearby drink bottling factory was damaging the road and affecting its drainage. In addition, he noted that rubbish bags that had been deposited in the street were being torn open by horses leaving rubbish to blow into the drainage channels. He considered there to be a need to raise and resurface the street and keep it clean and he noted that, overall, people were angry at the situation of flooding in the street and frustrated by the lack of government assistance.
He believed there was need to teach people to keep the street clean and he thought that more public participation in planning would be helpful. However, for him, it was clear that simple physical measures could be taken by the government to reduce vulnerability to flooding, however these measures were not being done due to there being a general sense of apathy and lack of environmental consciousness amongst those employed in local government. Whilst he said he did not believe corruption to be as bad as in Venezuela, he considered the level of corruption in the city region to be disastrous. He mentioned that, in the past, a community group and neighbourhood organisation had made representations to local government with complaints when a pump that was supposedly serving the area was blocked, however no follow-up action was taken. He said that, as a retiree, he was now more available to participate in planning, though believed that, currently, the government listens to concerns though does not take sufficient action to address flooding.

Environmental aspects

Environmental measures to reduce vulnerability to flooding could be taken by urban authorities in ways that have ecological, recreational and/or agricultural value that could also be beneficial to public health. There was, however, little or no mention of such environmental measures to reduce vulnerability. However, a total of 47 participants (95.9%) referred to local and regional natural environmental causes of flooding in their responses. As well as noting deforestation and diversion of waters from other areas, PFV Participant 13 of Fontana believed that "the climate is changing…God is annoyed with us". PFV Participant 39 of Barranqueras considered there "is a lack of environmental consciousness". Excessive rubbish blocking the drains was attributed by a few participants to horses and dogs tearing up rubbish bags that had been deposited in the street. PFV Participant 48 of Resistencia, for example, said that "rubbish removal by the municipal authority for her neighbourhood is daily, however drains are being blocked as the deposited rubbish bags in the street are being split open by dogs as well as horses". PFV Participant 10 of Antequeras stressed that "animals and lots of rubbish in the streets in flooded areas lead to hygiene problems". Also, with regard to animals, PFV Participant 3 of Antequeras mentioned that "at the time of flooding, there was only one road in and out of the settlement…there are further risks because of animals sharing the limited space with people and vehicles". As well as the risks of animals sharing the street, it was perhaps unsurprising to discover that many participants referred to infestation from various creatures including rats, snakes, scorpions, frogs, insects/ants. PFV Participant 45 from Puerto Vilelas mentioned that "during a recent flooding event, when the street was cut-off, animals, such as ants and frogs, entered the house". PFV Participant 42 of Resistencia also mentioned that "flooding led to movement of creatures, such as scorpions and crabs and snakes, towards the housing". PFV Participant 1 of Resistencia made the point that "flooding also impacts upon animals, fruits and vegetables too". With respect to environmental aspects of vulnerability reduction, the overall clear message was that participants were disappointed with respect to the waste management of their areas and many bemoaned the failure to remove rubbish from drains in time to prevent flooding.

Socio-cultural aspects

In fact, a total of 48 participants (98.0%) made responses that related in some respect to social capital and resilience. Many of the poor flood victims could not afford to have their own homes in less hazardous locations and/or could not afford suitable adaptation measures and so they were able to shed light on the experience of living with flooding in their semi-structured interviews. In contrast to the views of those of the professionals and politicians, it was striking that the responses of the poor flood victims went into much greater detail of the vulnerabilities and inequities experienced. PFV Participant 2 of Resistencia even referred to an instance when "someone died from electrocution during recent flooding". Many more made reference to flooding leading to the overflow of sewerage systems and the contamination of waters around properties and streets. Concern was also expressed over the remains when flooding subsides, such as by PFV Participant 4 of Antequeras who noted that "when the water goes down, there is a lot of dead animals and plastic lying around". There was deep concern over hygiene and many responses referred to health impacts of flooding on the participants themselves and their families. The semi-structured interviews did, in fact, give a great deal of insight into some of the diseases attributable to flooding; a total of 43 (87.8%) participants referred to health impacts of flooding in their responses, examples of which follow.

PFV Participant 10 of Antequeras believed that "damp in houses is a big issue" and PFV Participant 12 of Fontana believed that "respiratory problems are significant". Many participants, in fact, mentioned damp in their homes and the incidence of respiratory problems; examples were given of water on the lung, pneumonia, bronchial issues, asthma, flu, fever, colds and arthritis. PFV Participant 19 of Barrio San Pedro Pescador, who lived under the Manuel Belgrano bridge and wanted to be by the river as he sold fish that he caught for a living, considered that "damp leads to respiratory problems". PFV Participant 20 of Fontana believed that "flooding led to contamination and asthma and respiratory problems". PFV Participant 22 of Resistencia mentioned health problems due to damp and said that "my daughter has had respiratory problems". PFV Participant 27 of Barranqueras believed "the risk of flooding is increasing…houses are affected by damp and there are bronchial problems". PFV Participant 30 of Puerto Vilelas mentioned that "flooding led to

damp...my son has asthma". PFV Participant 31 of Fontana noted that "Flooding can lead to health problems such as respiratory conditions/asthma and problems with feet…I recently had to spend time in hospital". PFV Participant 32 of Barranqueras noted "I moved to the area by the river due to overcrowding...though I lost all of my belongings a couple of years ago and had to move a few metres again closer to the road because of the rise in level of river. Damp is a problem…both myself and my son had pneumonia and I have water on the lung". PFV Participant 39, an elderly resident of Barranqueras who had experienced a lot of flooding and also lost all of her possessions, mentioned that "the frequency of flooding was increasing and damp in my home has exacerbated bronchial problems and arthritis". PFV Participant 14 of Barrio San Pedro Pescador, who ran a kiosk and worked as a domestic, believed that "flooding caused respiratory for children…though the government showed little interest in helping with the plight of flood victims".

Further ailments attributed to flooding that were mentioned included skin conditions, spots, allergies, stomach illnesses, urinary infection and diseases of the blood. PFV Participant 21 of Fontana, for example, believed that "flooding leads to flu, asthma and skin conditions". PFV Participant 15 of Barrio San Pedro Pescador said "my son had recently spent three days in hospital with a skin disease because of recent flooding". PFV Participant 17 of Resistencia mentioned that "my daughter had blood infections because of the flooding,". There was a perception amongst some that the flooded environments held the potential for harbouring mosquitoes and dengue fever. PFV Participant 12 of Fontana, for example, noted that "mosquitoes were problematic after flooding and dengue is an issue". PFV Participant 34 of Fontana believed that "flooding led to health problems such as fever, cold, skin conditions and respiratory problems…and there are lots of mosquitoes when it is hot". He also said that "three snakes entered my house during a recent flooding event". PFV Participant 49 of Resistencia, who also remarked that flooding caused movement in creatures, said "there are health issues due to mosquitoes and dengue, though the area is fumigated against dengue."

Various other ailments or challenges were noted including high blood pressure, arthymia, drug taking and issues of personal hygiene. PFV Participant 6 of Antequeras noted that "poor people are suffering due to lack of employment…children in

particular suffer because of lack of food and medication". He also mentioned that "people in the area are taking drugs as if it were confectionary…and people are going hungry". The tendency for children and the elderly to suffer most from flooding was noted by several participants. PFV Participant 16 of Resistencia remarked that "There is a lot of health inequality…flooding leads to a high risk of a variety of health problems including dengue, danger from snakes…accidents through treading on things and holes in the road, bacteria and contamination and skin diseases. There is danger from a personal security point of view in taking alternative less familiar and/or restricted routes and there can be mental health problems". Several participants noted that living in a hazardous area had effects upon quality of life, feelings of frustration, insecurity and fear of robbery. Reference was made to flooding bringing about psychological, mental or emotional difficulties, with mention made of fear/worry, stress, depression, trouble sleeping and family problems. PFV Participant 13 of Fontana, for example, said that "there is continual worry of flooding and stress-related mental health issues...the health of young and old are affected, in particular, and work is missed through people staying at home to protect belongings" PFV Participant 5 of Antequeras, who had had fourteen children, said "I have high blood pressure and have trouble sleeping…I am nervous about the situation with regard to flood waters". PFV Participant 18 of Resistencia said "my house suffered structural damage at a time of flooding…I lost lots of belongings including a bed, freezer and television and sentimental things such as photos…I lost memories…sadness at such a situation can lead to mental health problems/depression, as well as the further health problems caused by flooding such as skin diseases, respiratory problems and blood disease. Nowadays, I place stuff higher up within the house". PFV Participant 7 of Barrio San Pedro Pescador also stressed that "flood events can lead to mental health issues". PFV Participant 25 of Barranqueras had also lost belongings and mentioned psychological and emotional difficulties. He said that "there was not enough focus placed upon the poor…flooding can put pressure on family relationships".

Further difficulties noted were access to health facilities, school or work during periods of flooding and difficulties in acquiring food and potable water. PFV Participant 13 of Fontana noted that "when there was flooding my children stayed at home waiting for it to subside". PFV Participant 31 of Fontana noted that "at times of flooding, the lack of lighting made the journey to and from school dangerous for my

daughter…her education can suffer." PFV Participant 30 of Puerto Vilelas recollected that "the housing project, of which my home was a part, was halted part way through prior to completion. However, during a recent time of flooding, an army truck came from Corrientes to help me move my belongings, and I went to stay in the nearby school built on stilts". PFV Participant 42 of Resistencia also recalled that "a military truck helped me move possessions when flooded in the past". Only one of the participants, PFV Participant 6 of Antequeras, stated that "the community ought to be left alone". PFV Participant 44 of Puerto Vilelas made the point that "when the water levels are high, animals cannot graze". Many considered humanitarian assistance to the poor to be insufficient or poorly distributed and wished for greater help from the government to deal with flooding with better provision of housing and healthcare facilities during periods of flooding. PFV Participant 8 of Barrio San Pedro Pescador noted that "The government does not pay enough attention to the challenges faced by the community…and assistance that is given out is distributed poorly and acquiring potable water can be costly". PFV Participant 17 from Resistencia believed that "government help has been minimal…a bag of food and a bed" and PFV Participant 18, also of Resistencia, noted that "the government gave help of food and a bed, though assistance was late…there is a pressing need for new houses". Many tended to express the view that the community could not rely solely upon state assistance.

In total, existing socio-economic and cultural adaptation measures were mentioned by 44 participants (89.8%) within their responses. In respect to attempts to cope with the difficult circumstances encountered, many participants had shown their resilience and resourcefulness, such as PFV Participant 32 of Barranqueras (see Box 6.6). Amongst those who had remained at home during times of flooding, many participants made the point that neighbours and/or relatives were helpful with each other. PFV Participant 8 of Barrio San Pedro Pescador noted that "various ethnicities in this fishing community peacefully co-exist, such as our Guarani and Japanese neighbours…and a relative uses a vehicle to go and purchase bottles and fetch them back from Resistencia". As well as a sense of mutual help amongst flood victims, some participants noted the helpful contribution that was being made by faith groups. PFV Participant 42 of Resistencia recalled that "a German priest helped raise money for the building of the church". PFV Participant 2 of Resistencia had been involved himself in a building project of his father for a church upon stilts. PFV Participant 41

of Fontana remarked that “Buenos Aries is violent, so I decided I would much rather live with my family in Chaco. I am accustomed to living with flooding and the neighbours are cooperative and work together. I am involved with the Pentecostal church and was accommodated by them for four years whilst my house was being constructed over the road”.

Many of the participants seemed to be accustomed to a life close to nature and to the frequent occurrence of flooding, and most seemed to be originally from the north of Argentina (though often of Spanish or Italian roots). Lots of poor flood victims perceived their neighbourhoods to be close-knit and peaceful with neighbours who lived a humble and cooperative lifestyle. However, it was clear that many living in flood-prone areas experienced a great deal of hardship and, as noted by PFV Participant 4 of Antequeras, “each household has its own particular problems and challenges”. In the opinion of PFV Participant 30 of Puerto Vilelas “there is a need for the government to have a greater focus upon the vulnerable”. Many interviewees relied upon both material and emotional/psychological support from friends, family, neighbours and faith groups rather than just passively relying upon the support of urban authorities. Several interviewees reported that they and/or members of their family had had to move for the duration of a flooding event, and they had gone to live temporarily with a relative, a friend, or in the spare room of a classmate. PFV Participant 17 from Resistencia, for example, said “I am looking for a house for myself though I had to move to live with my father because of flooding”. Many participants seemed to share the view that there was untapped potential amongst the community and such unused capacity could contribute considerably to reducing vulnerability. PFV Participant 3 of Antequeras, for example, noted that “There is a need for a participatory political process and projects to improve conditions for the community…neighbours help each other with construction and I believe there is a lot of potential and unused capacity in the community which could be used to benefit the area”. An interview considered illustrative of some of the issues related to flooding, particularly in respect to risks to health and the significance of socio-cultural aspects to reduction of vulnerability, was that conducted with PFV Participant 46 of Resistencia (see Box 6.3 below).

Box 6.3 Poor flood victim of Resistencia
(Participant 46: Female; Interview with author on 22nd July 2016)

An interview considered illustrative of some of the issues related to reduction of vulnerability to flooding, particularly in respect to socio-cultural aspects, was that conducted with Participant 46, a flood victim of Resistencia. This family woman had been living with her grandmother though for the sake of her independence had moved to her current place in a street that had recently flooded. She believed that flooding was due to the heavy rains, a changing climate, drainage issues on account of proximity to a complex system of lagoons and blocking of drains due to rubbish being deposited in the streets. She believed, however, that the local government was corrupt and doing little or nothing to address flood risk and the issue of climate change. She mentioned that during a recent flooding event, the police had come to look at the situation in the street, though no action was taken as a consequence. She mentioned that there had been some meetings held in the neighbourhood in the past though these had been poorly attended and some of those in attendance may have gone along just to beg for materials. She did, however, express an interest to be involved in a more genuine, participatory planning process for the area.
Contaminated flood water had recently entered her house leading to foul air. She also noted that flooding could lead to asthma, dengue and flu, and was also potentially dangerous in terms of accidents. She cited an example of having stepped into a water-filled hole herself, up to about waist height, with a baby in her arms when she had needed to go out to buy food at a time of flooding. The place that she had moved to is a dilapidated, abandoned house that she wanted to invest in and make her home. She was waiting to see if the owner re-emerged to claim the house back and so, by way of precaution, she had taken photos of the state of the abandoned place so that she would have evidence, if necessary, of those investments that her or her family had made since moving in. She lived with a readiness for further flooding, using rugs, for example, rather than carpets so that they could be quickly rolled up if necessary.
She mentioned that flooding was becoming more frequent and had been asked by local activists to join a demonstration over the situation. She believed there was a need for provision of better infrastructure of drains, pumps and sewers for the neighbourhood though, in the absence of suitable government public works, she felt compelled to adapt as best she could, often with the help of neighbours. Clandestine connections had been made for her to the electricity supply with the help of a local neighbour, and she was awaiting connection to the sewerage system. Occasionally, she cleaned rubbish out of the storm drains in the street herself. It was clear that the participant and her family were very vulnerable to flooding though she showed great energy, resilience and humour, despite her circumstances. It was clear that her social networks were vitally important to her as she sought to adapt to the flooding and improve the situation, in general, for the family.

Economic aspects

A total of 27 participants (55.1%) referred to socio-economic and cultural causes of flood risk in their responses, with many participant responses noting that the marginalisation of poor was due to economic difficulties and a lack of investment in the poor and/or in the areas within which they reside. PFV Participant 16 of Resistencia noted that "flooding impacts upon people economically as they are unable to work and have less money…there is food insecurity and children and elderly in particular are vulnerable…affected children miss school at times of flooding. Proposed government works are not getting the funding required…the city is in debt". PFV Participant 43 of Barranqueras said "I suspect the government does not have an emergency budget". Many others believed that any assistance during a period of flooding was poorly distributed and some were very critical of the track record of economic aspects of government approaches. PFV Participant 35 of Resistencia believed "a lot of money is disappearing"; a point also made by PFV Participant 44 of Puerto Vilelas. PFV Participant 14 of Barrio San Pedro Pescador, who lived by a lagoon prone to flooding, referred to inability to afford personal property and said "If someone is without work it is difficult for them to afford adaptation measures…Funding from central government is not reaching intended beneficiaries…some families received help whilst others did not…because of the corrupt nature of government, those with personal connections are more likely to receive help". PFV Participant 17 from Resistencia also believed that "government funding is being misappropriated…and assistance is difficult to access, anyway, without legal standing/papers". PFV Participant 7 of Barrio San Pedro Pescador was, as a former fisherman, aware that "people are accustomed to the lifestyle in areas at risk of flooding though government monies, that were supposedly for flood victims, are not reaching the intended targets". PFV Participant 45 from Puerto Vilelas spoke of the question of corruption and considered "change is critical though the economic situation is more critical than the political one". A total of 41 participants (83.7%) made some sort reference to a socio-economic dimension to the challenges they faced, and many responses noted that the neighbours and community were helpful, charitable and/or cooperative. The overall sentiment of poor flood victims was that Chaco was

in need of a lot of help, though currently the government was corrupt and tended to support business/commercial interests rather than the vulnerable poor.

Citizens who are vulnerable to flooding could take a range of economic measures to reduce vulnerability to flooding, and community spirit and sharing of bread, milk and water, for example, were considered vital given the lack of government assistance. Several participants lived close to the river as they were originally from the area, and a significant driver for living in such a hazardous area was their own strategy of making a living from fishing, such as the household of PFV Participant 33 of Barranqueras. She noted "I am originally from the area and my husband is a fisherman, and I feel at home…there is a strong sense of community…the area is peaceful/tranquil, and I feel safe from a security standpoint". A variety of occupations were mentioned, however, such as domestic worker, shoemaker, office worker, porter, student representative, cook and maid. Indeed, economic diversification could be a way the household incomes are increased, and security of income maintained or improved. PFV Participant 42 of Resistencia, for example, came from the interior of the region and recollected "I worked as a live-in maid at first, though now I have a number of jobs such as working at an estate agency and making bread for sale…having a number of jobs is a good strategy for reducing vulnerability and enhancing resilience". PFV Participant 41 of Fontana said "I moved from Buenos Aries and now I make bread for sale here at my house". As PFV Participant 26 of Resistencia remarked, migration for work and study is the story of many occupants of the city as they seek to achieve economic stability and improve their circumstances incrementally as the interview with PFV Participant 32 of Barranqueras in Box 6.6 illustrated. PFV Participant 46 of Resistencia also mentioned having benefitted from clandestine connections to services. A total of 27 participants (55.1%) made suggestions for socio-economic and cultural adaptation measures within their responses, with several suggesting a need for an increase in the government budget and better distribution of assistance with a focus on helping the most vulnerable. PFV Participant 17 from Resistencia, for example, suggested that "more government help was needed through door to door engagement to ensure deserving people were the recipients of assistance".

Political/institutional aspects

In theory, city region authorities could seek to ensure that relevant policies, structures, building codes and mechanisms are in place with the aim of reducing vulnerability to flooding, seek to ensure participation of the vulnerable poor in such efforts and establish effective collaboration between appropriate stakeholders. However, a number of participants believed the local government had a short-term view with a lack of continuity. There was the perception amongst some that there was a tendency for authorities to make excuses rather than seeming to help very much. PFV Participant 38 of Barranqueras, for example, believed that "there needs to be a focus on provision/maintenance of adequate drainage and improvement of the situation with better pumps…bureaucracy gets in the way…the government always makes excuses and does not fulfil its promises". Several participants believed that the government made promises though accomplished little or nothing and offered little in the way of action other than, perhaps, a pretentious show of interest. Political processes were perceived by many as being of dubious quality with little or no follow-up action, and PFV Participant 37 of Barranqueras, said that "when attention is paid to flooded neighbourhoods it is usually just when politicians are canvassing for votes around election time". Those working in local government were perceived by many as having little sense of responsibility. It was mentioned that there was a lack of statistics and that administrative delays were common. PFV Participant 47 of Resistencia said that "the government does not seem interested in addressing the flooding problem of the vulnerable". PFV Participant 34 of Fontana was a poor carpenter living on his own who had moved to a hazardous site by a lagoon because he could not afford elsewhere. He considered that "the community is cooperative…though all of my neighbours had had problems with flooding…monies to help the vulnerable either did not arrive, were poorly distributed or spent incorrectly". Nepotism was considered to be rife in local government, with those having personal connections to people in positions of power, either through friendship, through being a relative and/or through sharing political allegiance, being those more likely to be helped; frustration often culminated in political demonstrations as noted by PFV Participant 26.

Of the 49 participants interviewed in Phase 2, only 1 of them worked directly within a provincial water management authority. However, a total of 41 participants (83.7%) referred in their interview to the existing state of play of participatory/collaboratory approaches to planning within local governance, experiences of them or challenges

faced. A number of participants referred to there being a lack of good planning and a need for better implementation of existing policies. Many felt there were no existing opportunities to be involved in planning, with a number of participants referring to there being a distance between government/ professionals and the community, and a lack of cooperation. PFV Participant 8 of Barrio San Pedro Pescador, who had remarked upon corruption, lack of government attention and poor distribution of assistance, said that "there are no opportunities for participation in planning though I would like to be involved".

Some participants did make mention of some involvement in participatory or collaborative efforts, such as PFV Participant 22 and PFV Participant 23 of Resistencia; however, they expressed their frustration at the outcome. They both helped to put forward an interdisciplinary project for a community action group to help flood victims though were disappointed at the lack of government support and believed that their idea had been stolen. PFV Participant 22 suggested that "the government should check people from house to house in order to more fully understand the situation, not just in relation to flooding but for different problems. The community is suffering economically and needs basic resources…given the lack of government support, the community itself has been charitable in providing the needy with food, milk, water and bread". PFV Participant 23 mentioned respiratory problems and said that "the health of my daughter has suffered because of flooding…there is a need to focus efforts on helping children, young mothers and the elderly". PFV Participant 7 also mentioned "a project was undertaken by a team from the university with regard to the planning of the neighbourhood, though no governmental action was taken after these efforts". A number of participants gave the impression that the government was simply not listening. PFV Participant 2 of Resistencia stated that "there are a lot of health problems, including psychological ones…children in particular suffer. There has been a lot of collaboration amongst the community and faith groups, however there was not enough government investment for the most vulnerable. I was involved in a consultation exercise for which there was no consequent action taken…the government seems to listen around election time though takes no consequent action". PFV Participant 46 of Resistencia also remarked upon poor attendance at consultative meetings. Many expressed doubt over the current quality of participatory processes though the majority of interviewees did express an

interest in being more involved in participatory planning processes for their area. PFV Participant 9 of Antequeras mentioned that "the elderly and children were the most vulnerable…there is not enough help for them. There is a need for more public participation in planning and I would like to be involved in that myself". PFV Participant 39, an elderly flood victim of Barranqueras, mentioned that "the government did not do much to help during a recent flooding event other than provide a couple of bags of sand to help keep water and snakes at bay. The government needs to see what people require, however the government is corrupt and does not distribute funding that it has received appropriately to address the issue of flooding and help the vulnerable…the community has demonstrated by blocking the road. Planning is very important, however I have not been invited to participate though, given my experience of many decades living with flooding, I would like to contribute to the planning of the neighbourhood". In general, participants considered there to be a poor level of public engagement in governmental approaches to planning and had a lack of faith in the capacity and intent of the government. Taken as a whole, the views of poor flood victims tended to stress the need for the government to take a more 'pro-poor' focus with a greater awareness of what happens to households in areas of flooding at the actual time of flooding. The interview with PFV Participant 16 of Resistencia was considered illustrative of many of the issues related to reduction of vulnerability to flooding, particularly in respect to political aspects, and so it features within Box 6.4 below.

Box 6.4 Poor flood victim of Resistencia
(Participant 16: Female; Interview with author on 29th March 2016)

An interview considered illustrative of some of the issues related to reduction of vulnerability to flooding, particularly in respect to political aspects, was that conducted with Participant 16, a flood victim of Resistencia. She believed there to be a high risk of further flooding in the area because Chaco province was in a low-lying basin and, along with effects from climate change and El Niño, rainwater was failing to drain away quickly. Health issues she noted that resulted from the flooding were dengue, dangerous snakes, accidents through treading on things and stepping into holes in the floor, bacteria and contamination, skin diseases and mental health problems. She mentioned that flooded areas can also be dangerous from a security point of view, with alternative and/or limited routes potentially being riskier. She considered there to be a lot of health inequalities in the area, with children and elderly particularly vulnerable, and thought that flooding had an economic impact on people as it affected their ability to work and, therefore, their income. She believed there was considerable food insecurity amongst children, who were also missing out on their education during times of flooding. Given her financial situation, the young woman had postponed her own studying. In the context of flood risk, she felt that there was a lack of hope amongst the community and noted that poor were occupied with their own day to day livelihood strategies.

She made several suggestions as to how adaptation to flooding in the area could be improved. She considered there to be a need for better statistics to give greater insight into the lives of the most vulnerable. In her opinion, there was also a need for better planning of the city, with better implementation of policy, greater collaboration between professionals, and a greater degree of participation of the community. She considered there to be a need to clean out the flood drains of the city and to have an education programme to keep places clean. She mentioned there was a need for better control of areas along coasts (of river and lagoons), a need for infilling of holes, improvement of the lowest areas, perhaps through land raising works, and a need for greater control of animals and insects, both before and after flooding.

Despite the glaring vulnerabilities of the local poor, she thought that the government was currently not publishing enough statistics and was not really listening to the people either. She mentioned that the city region was in a lot of debt, and that corruption lay behind everything, with people working in government using the situation with regard to flooding to their own advantage. Also, she said it seemed as though the government did not want local people to be happy through better distribution of resources and provision of work programmes but, instead, was rather focused upon promotion of events, such as the international biennial sculpture competition.

iii) Preparedness for responding to flooding

This category concerns perceptions of strategies and measures for preparedness for responding to flooding. There can be a broad range of such activities and so, based on the work of Wamsler and Brink (2015), this section is subdivided into themes, i.e. physical, environmental, socio-cultural, economic and political/institutional activities (be they actual/existing or suggested/future activities). Each of these sub-sections forms a summarised record of perceptions of poor flood victims with regard to the experience of preparing to respond to flooding within the Resistencia city region. Where possible the assessment of the data has sought to identify comments with regard to the following characteristics: a) style(s) of approach (effectiveness, inclusivity, flexibility, equitability); b) public participation (degree and quality) / unused capacities; c) collaboration (degree and quality) / appetite for improved forms of governance. Considered together, and in relation to the corresponding sections within Chapter 6, these sub-sections illustrate differences between top-down and bottom-up perspectives, highlight the imbalance in scope and emphasis of approaches to flooding, and note the absence of sound participatory practices and the need for better coordination/co-operation amongst sectors.

Physical aspects

Given the level of corruption that was noted by many interviewees, it was unsurprising to note that many considered that the governmental help offered in respect to preparing to respond to flooding was minimal. Many expressed frustration at the lack of governmental strategy and lack of material help when a flooding event actually transpired. PFV Participant 32 of Barranqueras expressed her disappointment, for example, and PFV Participant 40, a parent of young children who lived in Barranqueras, noted that "the government had only provided two bags of sand" and PFV Participant 49 of Resistencia noted that "a pump was provided in the street though it needed to be provided earlier". PFV Participant 46 of Resistencia gave a clear example of a physical danger encountered as noted in Box 6.3.

Several interviewees made reference to the potential need to move to a temporary shelter and/or their actual relocation to one, often with help that was non-

governmental. PFV Participant 17 of Resistencia, for example, noted that "I am looking for somewhere to live though I moved to live with my father because of the flooding". PFV Participant 25 of Barranqueras said "the government provided help with some provisions; however, there was a lot of mutual help amongst the community and assistance from the church". PFV Participant 32 of Barranqueras was a flood victim who had benefitted from the help of her brother. PFV Participant 33 of Barranqueras said "there is a lot of social marginalisation and a house that had been promised by an association did not materialise and I had to move away for three months during a recent period of flooding". PFV Participant 5 of Antequeras believed "there needs to be provision of better housing on higher land or on stilts. If flooding were to get much worse, I plan on moving up to land by the roundabout on the main highway between Corrientes and Resistencia". PFV Participant 2 of Resistencia said "there is a need for concrete solutions and provision of places to go during times of flooding…there needs to be arrangements made to provide potable water, maintain an energy supply and provide vehicles". PFV Participant 24 of Isla Cerrito believed "there needs to be more of a focus on helping the poor, with a focus on helping the young in constructing homes". PFV Participant 3 of Antequeras noted that 'During times of significant flooding, I stay at this house that I constructed on higher ground close to the roadside here".

A number of interviewees referred to the raising of furniture in their homes. PFV Participant 13 of Fontana, whose house was low compared to the street, said that "flooding caused damp to both the house and clothes. However, I have lifted things up higher within the house. The community are helpful". PFV Participant 38 of Barranqueras noted that "there only needed to be 100mm of rain for my house to be flooded…there is a lack of adequate drainage and sewage systems. There is damp in the walls and furniture has been ruined. I moved from a place that suffered worse flooding and bought sandbags and I rely upon pumps and have raised the level of flooring in the house incrementally at great expense. There ought to be greater provision of materials to help raise ground levels for those who needed them". PFV Participant 18 of Resistencia said "my house suffered structural damage at the time of flooding…I have now placed my stuff higher up within the house". PFV Participant 5 of Antequeras said that "water flooded the bathroom and furniture during a recent flooding event…my bed is placed upon wood to elevate it above water". PFV

Participant 46 of Resistencia also raised furniture up and said "I took photos of the original state of the abandoned house, when I first moved in, so that I had evidence, if necessary, that I had made investments that had changed the house from the state I found it in…I'm also awaiting connection to the sewerage system and a neighbour has been helping with connections to services". PFV Participant 9 of Antequeras noted "I moved to the area as I felt more secure here...however, dengue is a problem…my husband is involved in a fumigation programme against mosquitoes. Flooding is a continual problem…he has built up a raised level to the rear of our accommodation in readiness for further flooding". PFV Participant 37 of Barranqueras spoke of recent serious flooding in her street and she said "I have trouble sleeping with worry and concern over whether pumps are working. Contaminated water entered the house and the walls became damp and furniture damaged. I bought a pump and boots and furniture was placed on bricks. I want help to raise the level of house". Frequent cleaning/disinfecting was mentioned by several participants. PFV Participant 33 of Barranqueras, for example, noted that "a flood alert was received from a governmental agency which enabled precautions to be made. The roof was changed for a metal one…and upon return to the house, following a recent flooding event, I cleaned it thoroughly". PFV Participant 35 of Resistencia mentioned that "at the time of flooding I had a boat and I have adapted the house with tiling downstairs on the floor and walls for ease of cleaning. We also have a second kitchen upstairs". Vulnerable citizens took a range of physical measures for themselves in preparation for responding to flooding, though it was clear that many of the responses for this category noted that measures taken involved mutual help from within the community.

Environmental aspects

As noted above, many poor flood victims considered that frequent cleaning/disinfecting was important both in and around their homes; however, unsurprisingly perhaps, given that many flood victims considered themselves as being accustomed to living close to nature, some responses also showed the close relationship of people to regional flora and fauna. Citizens who are vulnerable to flooding can use keen observation of natural phenomena to predict the weather and/or imminent onset of flooding and such a remark was made by PFV Participant 33 from Barranqueras; the interviewee mentioned that "observation of the movement of the

tail of a golden fish in a certain way is taken as an indication that flooding was imminent". PFV Participant 43 of Barranqueras actually kept an iguana, that had made its way into his house at a time of flooding, as a pet. As expressed elsewhere in this chapter, many participants did refer to waste management issues and the failure to remove rubbish from drains in time to prevent flooding, with note made of horses and dogs tearing up rubbish bags that had been deposited in the street. Other than such observations, however, there was little mention of environmental measures taken in preparation for responding to flooding.

Socio-cultural aspects

In terms of socio-cultural measures that urban authorities could make in relation to preparedness to respond to flooding, many participants made reference to humanitarian assistance at the time of flooding. A couple of participants, such as PFV Participant 1 of Resistencia, made reference to government warnings received on the radio. Mention was also made of help from government staff for the construction of temporary housing, such as by PFV Participant 26 of Resistencia. A total of 44 participants (89.8%) referred to existing socio-economic and cultural aspects to adaptation within their responses. Despite acknowledgement of the humanitarian assistance received at times of flooding, many flood victims considered, however, that the people of Chaco were in need of a lot of help. Many perceived government approaches as being woefully inadequate including Participant 36 of Barranqueras. PFV Participant 9 of Antequeras believed "there is very little help from government with regard to flooding…the government is reactionary and lacking in strategies to address flooding". PFV Participant 31 of Fontana believed that "Given the level of flood risk, there are no government strategies, only a minimal amount of help". Responses made also included perceptions of a lack of continuity in governance and a sense that no one seemed to be in charge in relation to flooding events. PFV Participant 3 of Antequeras, for example, believed "there is no focus for responsibility for dealing with emergencies". Several responses referred to cuts in electricity and difficulties or challenges in accessing potable water. PFV Participant 8 of Barrio San Pedro Pescador said "I buy water…I use the car to fetch it from Resistencia and PFV Participant 2 of Resistencia noted "there is a need for potable water…and there is a lack of vehicles. PFV Participant 11 of Antequeras mentioned that "the government

has not returned to clean the toilets that were provided for fifty displaced families living by the roadside". Some perceived there to be a lack of provision of housing and/or suitable locations for housing, such as PFV Participant 14 of Barrio San Pedro Pescador, who noted "there is a need for better housing locations", and PFV Participant 32 of Barranqueras.

Vulnerable citizens can, of course, make a range of socio-cultural measures in preparation for responding to flooding, and many of the responses revealed a range of such approaches to adaptation which showed optimism and positivity. It was evident that, rather than rely on the authorities, many households took measures for themselves and many noted a heavy reliance upon the generosity and cooperation of family, neighbours and faith groups in their approach to responding to flooding. Some participants and/or their family members made arrangements to move away if serious flooding were to occur. PFV Participant 14 of Barrio San Pedro Pescador noted "I moved to the house of my cousin when there was flooding". PFV Participant 45 of Puerto Vilelas said "I arranged to live with my mother for two months during a recent episode of flooding. A truck arranged by the municipality came to help with moving possessions…however, government help was minimal, such as clothes and shopping (groceries). In terms of adaptation measures, I have relied on the help of my brother, who lives next door, for building-up land and cleaning-up after flooding. Despite the serious flooding that has occurred, I am positive with regard to the potential of the area which is peaceful with good relations amongst neighbours and there are water and electricity supplies".

Preparations were made by some to live on higher ground by the roadside such as by PFV Participant 4 of Antequeras who said "I bought this higher land by the roadside and constructed this temporary accommodation here in readiness for flooding, approximately four kilometres away from home. I am living here during this period of extensive flooding. Personal hygiene is important…I have constructed a toilet and shower in the temporary accommodation, and have gas, water and my own boat". PFV Participant 3, also of Antequeras, noted "The caravan in front of this place is ready if flooding were to become worse and we are displaced…some people have alternatives others do not". Amongst those who had intended to stay behind during flooding episodes, various measures were mentioned such as the storing of goods and items

that could be of use to them. PFV Participant 24 of Isla Cerrito, for example, said "I have a canoe" and PFV Participant 49 of Resistencia said "I made preparations such as acquiring equipment and boots and, if flooding is imminent, I acquire food supplies in readiness". Interestingly, he also noted that **"**I acquired a certificate from a nearby police department as evidence for my employer for when flooding made it too difficult to get to work". PFV Participant 28 of Barranqueras mentioned that "services in the neighbourhood are affected when there was flooding, I raised belongings such as the stove, washing machine and fridge in the house on wooden blocks to keep them above damp. I ensure I have dry clothes and I keep shopping provisions in store in case of flooding and I do not intend to leave the house when there is flooding". A number of participants mentioned that they had their own pumps and/or boats in readiness. PFV Participant 40 of Barranqueras, for example, said "My brother gave me a pump as a gift and I bought cleaning materials to clean up after the flooding of the house and I intend to raise floor levels".

Clearly, social capital and cohesion amongst the community can help facilitate mutual assistance in preparing for flooding and the rapid diffusion of hazard warnings. PFV Participant 35 of Resistencia mentioned that "my neighbours are always helpful, prepared people…also, in my previous experience of major flooding in the past, my employer helped me with a place to stay temporarily". PFV Participant 30 of Puerto Vilelas considered that "governmental help is less significant than that provided by voluntary groups and charitable assistance". Many noted a heavy reliance upon the generosity and cooperation of family, faith groups, neighbours and community associations in their approach to responding to flooding such as PFV Participant 36 of Barranqueras. Arrangements could be made for a family member to stay awake to be alert to the onset of flooding or for a family member to guard a consequently evacuated home against theft and damage to assets. PFV Participant 30 of Puerto Vilelas recollected that, at a previous time of flooding, "My son stayed behind to guard the property/belongings, having been left with a bed which he had to move within the house as the flooding increased…he had to hang on to roof at a time of high winds…Wooden pallets are used to keep belongings higher off the floor in the house and my brother, who lives in the neighbourhood, helped with construction of the roof". PFV Participant 27, living in an area of a disused railway line in Barranqueras, thought that "in general, neighbours are helpful with each other. A stockpile of wood is shared

amongst neighbours for adapting their homes and raising items such as the bed and freezer when flooding was imminent".

A total of 27 participants (55.1%) made suggestions for socio-cultural aspects of adaptation within their responses. Participant 2, a poor flood victim of Resistencia, said "there was a need for concrete solutions and provision of places to go during times of flooding. Arrangements need to be made for provision of potable water, energy supply and vehicles, and more social/psychological help…there is a lack of planning and a need for collaborative efforts, more education with regard to social, cultural and environmental matters and more work opportunities for young". PFV Participant 4 of Antequeras also thought "there is a need for provision of drinking water at times of flooding". There seemed to be an overall feeling that assistance from the authorities was inadequate and, given the scale of the problems involved, the authorities could not be relied upon. However, on the whole, neighbourhoods were seen as close-knit and peaceful with neighbours who were humble and cooperative in a lifestyle that was close to nature. Each household noted its own particular problems and challenges and the preparations for responding to flooding by and for the community were seen as vital.

Economic aspects

There were some comments in relation to economic aspects to preparedness for responding to flooding with reference to personal immediate economic circumstances, such as the comments made by PFV Participant 8 which mentioned the costliness of acquiring potable water. Overall, there seemed to be a sentiment that authorities were more focussed upon business/commercial interests rather than the vulnerable poor with mention made of there being resourcing issues, government debt and a lack of investment. Participant 16 of Resistencia, for example, noted "the overarching financial problems of local government". Many considered that any assistance for a period of flooding was distributed poorly. PFV Participant 8 of Barrio San Pedro Pescador, for example, believed "there is a lack of government attention and planning…the assistance that is available is poorly distributed". A number of participants believed that proposed works are not getting the funding required. PFV Participant 12 of Fontana believed that "politicians take money that is intended for

dealing with flooding and use it for themselves". PFV Participant 22 of Resistencia believed that "government employees used the situation to make money". Participant 33 of Barranqueras believed that "monies allocated to help flood victims are not arriving…and I do not hold out much hope for improvement from the government of Macri". PFV Participant 9 of Antequeras believed "there is a lot of corruption, with funds received by local government not distributed to flood victims". PFV Participant 19 of Barrio San Pedro Pescador thought "there is a lot of corruption…funding is stolen by both workers in local government and the community". The interview conducted with PFV Participant 30 of Puerto Vilelas was informative and illustrated some of the issues related to economic aspects to preparedness for responding to flooding (see Box 6.5 below).

Box 6.5 Poor flood victim of Puerto Vilelas
(Participant 30: Female; Interview with author on 9th June 2016)

An interview considered illustrative of some of the issues related to preparedness for responding to flooding, particularly in respect to economic aspects, was that conducted with Participant 30, a flood victim of Puerto Vilelas. She believed that flooding was becoming more frequent and had, in fact, suffered flooding at her home in the recent weeks prior to the interview, with the flood waters filtering up through the floor in the middle of the night. The flooding had made the house damp and her son was suffering from asthma. She believed the climate was changing and that there was a greater risk of flooding in the future. She felt there was a need for a greater governmental focus on vulnerable people, however she believed there to be a lot of corruption in the city region and that there were currently no suitable government strategies in place for the area.
At the time of recent flooding, an army truck had come from the city of Corrientes, across the Paraná River, to help her move some of her belongings, and she went to stay in the neighbouring school which was built on stilts. However, rather than solely relying on assistance from the government, she stated that charitable help and a number of voluntary groups of citizens were of most importance. As part of a housing project, works to the house had been halted part way through and as occupiers they had to arrange further work on the house themselves with her brother, who lived in the neighbourhood, helping with the roof. The participant and her family showed a great deal of resilience with respect to adaptation to the circumstances. Belongings in the house were kept higher off the floor through the use of wooden pallets and her son stayed behind during a recent flooding episode to keep an eye on the property/belongings; he was left with a bed which he had to move within the house as the flooding increased.
Despite the hardships encountered, she wanted to stay in the area given that the livelihood of her family was from fishing and they wanted to be within easy reach of the river. It seemed then that her experience of flooding was economically driven and preparedness to respond to flooding was an ever-present aspect to how the family lived their lives; this was done through either taking certain measures within the house, or through having an awareness of where assistance, from the government, charities, neighbours or family, could be found when needed.

Political/institutional aspects

In relation to political/institutional measures to prepare to respond to flooding, a couple of participants made reference to flood warnings received from government through listening to the radio, such as PFV Participant 1 of Resistencia who noted that "I had to move house though received notification of imminent serious flooding seventy days before on the radio". PFV Participant 33 of Barranqueras noted that "I

knew of a government flood warning which enabled precautions to be made. My roof was changed for a metal one". PFV Participant 38 of Barranqueras, however, noted "there was a lack of warning when flooding was imminent… Damp affects the vulnerable, especially small children. I am a community activist and along with neighbours have presented several projects for consideration. An organisation has been created to liaise with comments, though the government does not listen. The government does its own research on the situation though does not follow-up on it". Whilst urban authorities could, in theory, arrange appropriate evacuation planning and make efforts to collaborate effectively with relevant stakeholders and engage with vulnerable populations, government approaches with regard to responding to flooding were seen by many interviewees as being lacking in strategy, with authorities that were ill-prepared and/or reactionary. PFV Participant 46 of Resistencia even noted that "police came to look at the situation when there was flooding, though no action was taken as a consequence. There is a need for better infrastructure of pumps, drains and sewers though the government is not doing anything".

Several participants went further in giving clear examples of corrupt and/or criminal activities. On the one hand, there were incidents of theft, such as that noted by PFV Participant 19, who lived in a house under the Manuel Belgrano bridge in Barrio San Pedro Pescador. He said that "a portable chemical toilet, intended for relocated flood victims, had been stolen…there is a sense of insecurity in the neighbourhood". PFV Participant 2 of Resistencia noted that "three boats were stolen during a recent period of flooding". On the other hand, more systematic examples of corruption were noted whereby local politicians were considered to be cynically using the situation of flooding to attract funding from national government, with those monies not getting to the intended recipients. Many participants expressed concern over the widespread nature of corruption in the region and the country as a whole. PFV Participant 15 of Barrio San Pedro Pescador believed there to be corruption and PFV Participant 41 of Fontana said "there is an awful lot of corruption". Participants noted that monies were being stolen by government or community intermediaries, people were being paid to keep silent and/or monies being spent on matters other than the addressing of the flooding problems for which the monies were originally allocated. Some noted how widespread nepotism was in the Resistencia city region with prioritisation of the distribution of aid to friends, family and those of the same political persuasion. PFV

Participant 28 of Barranqueras said that "when politicians showed an interest at election time, the votes of some people were bought with meat and wine; when it's not election time, the government are not interested". Participant 27 of Barranqueras also stated that "the government cynically uses the situation of flooding to its advantage". PFV Participant 36, also of Barranqueras, noted that "corruption is a widespread problem for the whole of Argentina…it's a disaster for the country". PFV Participant 11 of Antequeras noted that "Argentina is a rich country though there is a lot of selfishness…nepotism/corruption is rife. The government does the minimum possible except when they want votes…their interest is merely a theatrical/cosmetic exercise with no action to follow-up. Local government uses the situation to attract financial assistance from national government to help with flooding, and upon receipt of that money does not distribute it properly". PFV Participant 2 of Resistencia, noted that there was "a need for concrete solutions and provision of places to go during times of flooding along with provision of potable water, energy supply and vehicles. Preparations need to be made for more social/psychological help for those who have suffered the impact of flooding". In general, many thought that the public sector ought to take more responsibility, be more organised and be more prepared to respond to flooding.

iv) Preparedness for recovering from flooding

There can be a broad range of activities in preparation for recovering from flooding. Based on the work of Wamsler and Brink (2015), this section is subdivided into themes, i.e. physical, environmental, socio-cultural, economic and political/institutional activities (be they actual/existing or suggested/future activities). Each of these sub-sections forms a summarised record of perceptions of poor flood victims with regard to the experience of preparing to recover from flooding within the Resistencia city region. Where possible the assessment of the data has sought to identify comments with regard to the following characteristics: a) style(s) of approach (effectiveness, inclusivity, flexibility, equitability); b) public participation (degree and quality) / unused capacities; c) collaboration (degree and quality) / appetite for improved forms of governance. Considered together, and in relation to the corresponding sections within Chapter 6, these sub-sections illustrate differences

between top-down and bottom-up perspectives, highlight the imbalance in scope and emphasis of approaches to flooding, and note the absence of sound participatory practices and the need for better coordination/co-operation amongst sectors.

Physical aspects

There was an overall sentiment that the government needed to take more robust and responsive approaches to dealing with flooding in the future in ways that kept pace with urbanisation and were more fully cognisant of the conditions encountered by the vulnerable poor. It was clear that many felt that there needed to be more of a focus on housing rather than expensive infrastructure projects, and that more could be done to provide housing settlements in readiness for evacuees were flooding events to occur. PFV Participant 14 of Barrio San Pedro Pescador mentioned that "major infrastructure works were halted because of the change of government. I moved to my cousin's house when I was flooded out. Better housing locations are needed… though we are working incrementally to build another floor behind the existing location of the house". Several interviewees did, in fact, mention physical measures in preparation for recovering from flooding taken at the household or neighbourhood level rather than just awaiting large infrastructure projects. Several poor flood victims mentioned receipt of help from local community organisations working with and for the community and, upon acquiring materials, some were able to work incrementally on improvements such as raising floor levels in the home or the building of further accommodation to the rear of the existing house. PFV Participant 12 of Fontana mentioned that "people use sandbags…I have elevated the floor of my home". PFV Participant 36 of Barranqueras said "I have been working incrementally to improve the house through raising/improving the floor". PFV Participant 44 of Puerto Vilelas was, as a farmer, committed to the area, and noted "A number of families lived by the highway in front of the house during recent flooding. The flooding affected the nearby fields and I built structures by the side of the road to keep the animals and I have built-up floor levels within the house and intend on having a raised walkway across to the house".

A total of 32 participants (65.3%) made suggestions for physical adaptation measures within their responses. A few respondents had the perception that there was a need for

another defence, improvement to pumps and further engineering to divert waters or infill lagoons, whilst others believed there was a need for housing projects with stilts, floating foundations or upon land that was at less risk of flooding. PFV Participant 5 of Antequeras, for example, thought "there is a need for provision of better housing on higher land and housing on stilts". A few participants, such as Participant 32 of Barranqueras, also made suggestions in relation to improvement of road surfaces with stones and the infilling of holes, and the provision of materials to help raise ground levels. The greatest number of responses for this category, however, referred to the need for more and better drainage and sewage systems and the better maintenance and cleaning of existing infrastructure to optimise its functionality.

Environmental aspects

PFV Participant 16 of Resistencia thought that "There needs to be better control of areas along coasts (of river and lagoons) and better control of insects, both before and after flooding". However, overall, there were few comments related to environmental aspects of preparedness to recover from flooding.

Socio-cultural aspects

A total of 41 participants (83.7%) made reference in their responses to a socio-economic dimension of social capital and resilience of relevance to this category. Many indicated there was a need for efforts to be made to prepare to recover from flooding at the personal and household level given the flood risk and failure of authorities to address it successfully. PFV Participant 49 of Resistencia said "I went with other members of community to request materials for land raising, though none was forthcoming…however, the community, in general, is close-knit and helpful". Many felt there was a need for a greater governmental focus on vulnerable people. PFV Participant 7 of Barrio San Pedro Pescador considered "the government is disorganised and corrupt…nepotism, political allegiances and corruption are having an impact on distribution of monies…those with personal connections are more strongly favoured when it comes to distribution of assistance monies". Measures taken to prepare to recover from flooding could, in theory, range from proactive networking to passive waiting for outside help or to even resort to substance abuse, an issue noted by PFV Participant 6 of Antequeras. Thankfully, most participants seemed to be

vigilant and better placed to recover efficiently and effectively due to their resilience being based on the maintenance of strong family ties and social capital amongst the community. Many participants were originally from the area and their families relied on fishing such as PFV Participant 30 of Puerto Vilelas who said "I use wooden pallets to keep belongings higher off the floor and I have relied on relatives to help with construction of the house and protection of it during a recent flooding episode. Charitable help from voluntary groups and family is very important…there is a need for a greater governmental focus on vulnerable people". Some noted the mutual help with construction of makeshift homes above the flooding by the roadside such as PFV Participant 32 of Barranqueras, for example.

It was clear that faith groups also played a key role as shown by the interview with PFV Participant 41 of Fontana. She remarked that "I would prefer to help the community through working with the church rather than a participatory arrangement with local government". In relation to the management of the city region, responses made included perceptions of a lack of continuity and a sense that no one seemed to be in charge in relation to flooding events, a sentiment expressed by PFV Participant 3 of Antequeras for example. PFV Participant 43 of Barranqueras remarked that "Moving people from unauthorised housing sights would prove problematic". Overall, there seemed to be the perception that the government was not taking enough responsibility for strategic approaches to adapting to future flooding.

Despite the disparaging views towards the authorities and the frustration that many felt, there were, however, several suggestions put forward with regard to socio-cultural aspects of preparedness for recovering from flooding. Responses often had regard for further research and further education. With regard to the former, several interviewees noted that there was a need for greater insight into the circumstances of the most vulnerable, to see how the problem of flooding was being addressed in reality. PFV Participant 37 of Barranqueras said "I want the government to check out the situation when there is serious flooding, not just when they want votes…corrupt people in government are using the situation to attract funding and not spending it appropriately". PFV Participant 16 of Resistencia, for example, noted that "the government was not listening…people sitting in government use the situation to their advantage and fail to publish enough data...coupled with better distribution of

resources and a programme for provision of work, there needs to be better statistics and greater insight into the lives of the most vulnerable". In respect to education, it was noted that programmes for consciousness raising/education were needed with respect to environmental management, sustainable development and keeping places clean. PFV Participant 16 of Resistencia, for example, thought that "There is a pressing need for flood drains to be cleaned, and there ought to be an education programme related to keeping places clean". PFV Participant 23 of Resistencia, believed that "more education programmes are needed". PFV Participant 20 of Fontana believed in education and said "I want to study to improve my situation". In terms of educational infrastructure, PFV Participant 37 of Barranqueras said "There is a need for a kindergarten" and PFV Participant 7 of Barrio San Pedro Pescador believed that "There is a need for a plan for low lying areas and a need for a school, a communal boat and more housing on stilts". In general, it was clear that poor flood victims perceived that the government had to improve hugely if a more responsible approach to recovery from flooding was to be taken in the future.

Economic aspects

Clearly, choices for vulnerable people can be particularly restricted if unemployed and living in an area where the informal economy is weak or non-existent and many responses expressed a wish for the government to take a more pro-poor focus, with some specifically saying there was a need to help the young. PFV Participant 31 of Fontana said "the household relies upon the income of my husband based on fishing and we did not have sufficient money to finish the house. Money is sent from national government though is, subsequently, not being spent properly on intended projects such as water supply and lighting. There needs to be more work provided for young people so that there is not so much of a reliance upon fishing". The responses of the poor flood victims showed that the ensuring of maintenance or enhancement of personal capital through cohesive networks of support in the community, and through sound family ties, was very much in evidence in the Resistencia city region. Also, a wish for greater investment in the area and an increased budget was expressed by a number of interviewees. PFV Participant 1 of Resistencia, for example, suggested "there ought to be more investment in tourism" and PFV Participant 7 of Barrio San Pedro Pescador expressed a belief in the good economic sense in developing the area

and said “effective strategies could save money in the long run…the neighbourhood by the river is expanding and has experienced a lot of development”. PFV Participant 40 of Barranqueras said “the house was flooded during Christmas and New Year…I aim to raise the floor level when I have enough money”. The interview with PFV Participant 32 of Barranqueras was illustrative of economic aspects of preparedness to recover from flooding at a personal level (see Box 6.6 below).

Box 6.6 Poor flood victim of Barranqueras
(Participant 32: Female; Interview with author on 13th June 2016)

An interview considered illustrative of some of the issues related to preparedness for recovering from flooding, particularly in respect to economic aspects, was that conducted with Participant 32, a flood victim of Barranqueras. A couple of years previously the young mother had lost all of her belongings in an episode of flooding having moved from another part of Barranqueras to land by the river outside of the flood defences because of overcrowding. She mentioned suffering from the damp and had water on the lung and, at the time of the interview, both her and her son had pneumonia.
She wanted the government to raise land levels, divert waters and provide more housing and building materials. She felt though that the government was not taking a responsible enough approach. She noted that the government had shown some interest in the plight of the poor though in spirit there was a distance between the government and the community. She thought the government did not actually help much in practical terms and she was angry and tired of unfulfilled promises.
Despite her frustration with the government, she remained hopeful and positive about the future and was being proactive in improving her circumstances. Following a recent rise in the level of the river, she decided to stay on the land by the river though had started to build a makeshift house with the help of her brother on an area that was slightly higher up a few metres closer to the flood defence/road. Her son was sent to live with his grandmother and she had found work as a domestic helper within the city centre of neighbouring Resistencia. She mentioned that her employer had been very kind and helpful, as were the neighbours. Through her work, she was managing to save some money to overcome the hardships she had been enduring and it was her ambition to continue improving her house at the site incrementally as and when she could afford it.

Political/institutional aspects

Several comments were made related to political aspects of preparedness for recovering from flooding by poor flood victims. Many comments noted that there was a lack of vision and too much short-term thinking amongst authorities. PFV Participant

25 of Barranqueras, for example, spoke of "a need for optimism and positivity… though the current government has short term thinking and is lacking in action and vision". Some participant responses bemoaned a lack of focus of authorities in helping the poor of the region. PFV Participant 12 of Fontana, for example, thought that "Chaco was not a priority for the new national government of Macri". PFV Participant 29 of Barranqueras thought that "the national government does not help much", a sentiment shared by PFV Participant 27, also of Barranqueras, who added that "the area suffered from a lack of good planning…I would like to see a more permanent solution to the issue of flooding". There was a belief amongst many that the situation with regard to flooding was not being addressed, let alone solved. PFV Participant 17 from Resistencia said that "government help was minimal…a bag of food and a bed…and children and elderly are particularly vulnerable". There was a sense that there was a great deal of incompetence on the part of municipal government, failure to implement policy properly and general disinterest in the conditions of the poor. PFV Participant 33 of Barranqueras said "I expect that I will be removed in two or three years as the government wants people to leave the area" Both PFV Participant 36 of Barranqueras and Participant 16 of Resistencia remarked upon a lack of environmental consciousness and apathy. Also, PFV Participant 7 of Barrio San Pedro Pescador bemoaned a lack of governmental action following a research project. Some believed that, rather than keeping pace with urbanisation/population growth with a progressive long-term view, politicians only seemed to pay attention to poor, flood-prone neighbourhoods when canvassing for votes. There was also expression of a belief that there was complacency amongst engineers with regard to the efficacy of the defences and pumps. PFV Participant 17 of Resistencia thought that "despite the need to maintain and clean the drainage system, the government is very irresponsible in terms of planning" and PFV Participant 18, also of Resistencia, said that "works were incomplete and there is a lack of continuity in governmental approaches to flooding". Many interviewees thought that attempts to resolve the situation with regard to flooding for the longer term were being foreclosed or hampered by corruption; some examples of comments made with regard to corruption follow. PFV Participant 17 from Resistencia said that "Corruption manifests itself in terms of money being taken for projects that were not completed properly…A community leader stole food to sell in a kiosk". Both PFV Participant 6 of Antequeras and PFV Participant 30 of Puerto

Vilelas bemoaned the corruption in government and lack of strategies to improve the area. PFV Participant 10 of Antequeras said “It’s like a civil war between supporters of the Radical party and supporters of the Peronist party”. PFV Participant 40 of Barranqueras said “the government is very corrupt with no idea of how to improve the situation with regard to flooding” and PFV Participant 28, living on land of the former railway company in Barranqueras, said “I want to stay settled in the area though I am that disgusted with the corruption in the area that I do not intend to vote”. Regardless of current legal standing with regard to their occupation of land, it very much appeared that the participants had a commitment to their neighbourhoods. Despite the political and economic challenges faced, several participants noted measures they took themselves to help prepare for recovery from flooding. Various comments were forthcoming that were related to community activism through neighbourhood organisations and mention was made of representations made and political protests/demonstrations. PFV Participant 12 of Fontana mentioned “there are continual protests by the community in front of the provincial government headquarters in Resistencia, the Casa de Gobierno”. PFV Participant 20 of Fontana also spoke of “a community protest cut off of the road” as did PFV Participant 26 of Resistencia.

A total of 33 participants (67.3%) made suggestions for strategic adaptation measures within their responses, many of which were relevant to this political theme of preparedness for recovery from flooding. The comments can be generalised as being three-fold: suggestions related, in some respect, to: the modus operandi and focus of the government; comments with regard to a perceived need for better representation and participation for and of the community; and strategic adaptation measures for research and education. Each of these are now considered briefly in turn with examples. In terms of modus operandi of the government, whilst many participants had noted the importance of day-to-day issues, such as the importance of simply keeping the street clean, an overriding sentiment that came out of the interviews was that the city region suffered on account of the perceived inadequacy of local urban authorities to plan for the longer term. Several interviewees suggested that the public sector ought to take more responsibility, ensure better implementation of existing policies, be more organised and more prepared for future flooding. Several people suggested that there ought to be better planning of low-lying, flood-prone areas

informed by a greater awareness of what happens to households in areas of flooding at the actual time of flooding through improved collection of relevant statistics. PFV Participant 10 of Antequeras noted that "there is a need to identify the most vulnerable and find out what they need". PFV Participant 20 of Fontana, who had bought another piece of land and, with help of family, moved house, believed that "the government is linked with business and the rich and does not help the poor…there is a need for a more 'pro-poor' focus". Responses also suggested a more collaborative approach to the planning of the city region was needed and PFV Participant 3 of Antequeras felt that "There is a need for establishment of a Commission of Emergencies". PFV Participant 11 of Antequeras also thought "there is a need for houses on stilts and, given that flooding in the area is going to be a problem every year, there is a need for government to take a stronger hand in solving the situation". PFV Participant 28 of Barranqueras thought "there is a need for more transport services to the area". PFV Participant 19 of Barrio San Pedro Pescador said "there needs to be a focus on helping the young in construction of homes".

The second group of suggestions was in regard to more involvement in the planning of neighbourhoods and/or the city region. A total of 41 participants (83.7%) made reference to participation in planning or a water management authority project, programme, collaboration or consultation exercise, either in relation to some form of involvement or wish to be involved themselves or, as was more likely, comments expressing frustration with the approach taken by the government. In fact, the majority of participants believed that greater degrees of collaboration and participation of the public in planning were good, helpful ideas, with most participants making it clear they would welcome more responsive processes if the views of the public were genuinely being taken into account. Despite the disappointment and frustrations of many, in general, the wish to participate in civic life did come out strongly in the semi-structured interviews, with most of the poor flood victims expressing an interest to be involved themselves in the planning of their neighbourhoods and/or the city region. PFV Participant 3 of Antequeras, for example, said that "neighbours are helpful with each other with construction and there is lots of unused capacity amongst community that could be beneficial in projects and participatory political processes to address flooding". PFV Participant 5, PFV Participant 9 and PFV Participant 10 of Antequeras said they would like to be involved in planning of their neighbourhood if given the

opportunity, as did PFV Participant 38 and PFV Participant 39 of Barranqueras. PFV Participant 15 of Barrio San Pedro Pescador said "I would like to be involved in planning and believe the neighbours would too". PFV Participant 4 of Antequeras said "The area is peaceful and community-oriented, and I have lived here all my life. However, the government does a lot of talking though takes little action....there is a need for the government to have more contact with the community and listen more as every family has its own problems…more collaboration is needed in the preparation of plans…I would like to be involved in a more participatory approach". Likewise, several other interviewees bemoaned a lack of opportunity to engage with governmental approaches to deal with the threat of flooding. PFV Participant 25 of Barranqueras, for example, said "I think flood victims are knowledgeable people, though there is no opportunity to participate within the planning system". PFV Participant 11 of Antequeras said "the government has not tended to provide opportunities to participate in planning" and PFV Participant 31 of Fontana said "there are currently no opportunities for participation in planning, though I would like to be involved". PFV Participant 45 of Puerto Vilelas said "I would like to participate in planning though I have not been given the opportunity", a sentiment echoed in the responses of PFV Participant 33 and PFV Participant 37 of Barranqueras. PFV Participant 8 of Barrio San Pedro Pescador said that "the government is not listening much and is corrupt…there are no opportunities for participation in planning at the moment though I would like to be involved". PFV Participant 26 of Resistencia stressed that "town planning ought not to be left just for engineers…the whole community needs to be involved…however those in control of planning do not wish to relinquish their power."

It seemed that many felt there were no real opportunities to be involved in planning, with a number of participants referring to there being a distance between government/professionals and the community, and a lack of cooperation between them. PFV Participant 49 of Resistencia said that "I would like to see better representation for the neighbourhood in a more participatory planning process, perhaps with some sort of multi-stakeholder commission to address the issue of flooding. I would prefer not to participate myself in a participatory planning process, though, especially since a supposed community representative had stolen money that

had been requested as assistance". Other issues/challenges that involvement in planning may entail were raised by a number of participants. The issue of availability or ease of involvement in a participatory event or process was raised by a couple of participants. PFV Participant 34 of Fontana, for example, said "I would like to be involved in planning, though not at the moment as I do not have the time". PFV Participant 27 of Barranqueras said "there is a big distance between professionals and the community…the government is not listening to the people… however, I would not have time to help in participatory planning". PFV Participant 17 from Resistencia said "I am a happy person and would like to be involved in a participatory approach to planning….though I am working as a domestic so I am not always available". PFV Participant 36 of Barranqueras said "I am more available to participate in planning now I am retired". PFV Participant 12 of Fontana said that "the government did not consult the public with regard to planning, though I would like to be involved if they did…there is a need for a big collaborative programme with citizen participation. Currently, the community is disorganised though people would like to participate in development for their area and I would like to be involved in participatory planning. Articulation in participatory processes could potentially present difficulties for indigenous peoples though".

The third type of response that could be identified in relation to suggestions was for more strategic approaches to research and education. A couple of participants suggested that there ought to be investigation of how the problem of flooding was being dealt with in other provinces and countries through an interchange of ideas. PFV Participant 4 of Antequeras, for example, thought "there is a need for education with regard to environmental management…and a need to learn from other examples of dealing successfully with flooding, such as measures taken in the Netherlands…the idea of floating foundations is a good one…there ought to be an interchange of ideas so that information can be gathered about the experience of coping and adaptation". PFV Participant 26 of Resistencia emphasised the key role played by education and PFV Participant 2 of Resistencia expressed the belief that "There is a need for more education with regard to social, cultural and environmental matters…and a need for provision of work opportunities for young, possibly focused on construction/building skills. There is a lack of planning…there is a need for collaborative efforts.". PFV Participant 13 of Fontana believed "there is a need for sustainable development and

interchange of ideas with the community. It would be helpful to consult with other provinces and other countries".

The general view seemed to be that the government ought to take more responsibility for strategic approaches to adapting to future flooding with suitable policies, structures and mechanisms in place that are informed through greater efforts to collaborate and through more effective approaches to public participation. However, the impression given was that the government was not collaborating effectively and was simply not listening and that, currently, there was little opportunity for public engagement in governmental approaches to address flooding. It was clear, however, that the community wanted to engage more fully in adaptation measures for their neighbourhoods, if the political processes were genuine and if real follow-up actions were taken based upon their involvement. An interview that illustrated issues related to political aspects of preparedness for recovering from flooding was that conducted with PFV Participant 7, a flood victim of Barrio San Pedro Pescador (see Box 6.7 below).

In summary, the poor flood victims tended to focus upon the impacts of flooding on their homes and neighbourhoods and considered there was not enough governmental help provided, often because of corruption. There was also the sense that governmental processes were closed though many expressed a willingness to participate in civic life. The next chapter moves on to analyse the results from this chapter and the previous one.

Box 6.7 Poor flood victim of Barrio San Pedro Pescador
(Participant 7: Male; Interview with author on 18th March 2016)

An interview considered illustrative of some of the issues related to preparedness for recovering from flooding, particularly in respect to political aspects, was that conducted with Participant 7, a flood victim of Barrio San Pedro Pescador, a neighbourhood near to the river and adjacent to the bridge between the cities of Corrientes and Resistencia. He believed that the climate was changing, though, as well as the rain, he noted the significant impact on flooding that was caused by the release of water from the major dams upstream. As a former fisherman, this interviewee had, initially perhaps, not perceived himself to have been a 'victim' when he first encountered flooding as a boy, as he had actually enjoyed it, seeing the scenario as fun. Now a middle-aged community activist and commuter to an office job in Resistencia, he is more fully aware of the risks to health at times of flooding. He mentioned that flooding impacted upon sewerage systems and led to difficulties in accessing potable water and noted ailments such as skin disease and stomach problems, and mental health issues and depression.

He felt the community needed a school, and a communal boat for the neighbourhood. He felt there was a need for more provision of housing on stilts and a plan for low lying areas. He would like to participate in planning if given the opportunity, however he considered that the government was disorganised and that there was widespread nepotism and corruption. He noted that funds for flood victims had not been reaching their intended targets and friends, family members and/or those sharing political allegiances with those in office were benefiting more from the distribution of monies. He also gave the example of an academic study of the neighbourhood, with findings/ideas for his neighbourhood that were presented by people with links to the university, for which he believed no action was consequently taken.

Whilst he considered approaches to planning to be very poor and, despite the continued risk of flooding, he still viewed Barrio San Pedro Pescador neighbourhood as being a desirable place to live with a close-knit community accustomed to the lifestyle. Furthermore, he believed that effective strategies for the area could save money in the long run and, given the recent expansion of the area, could help unlock its considerable development potential.

CHAPTER 7

Analysis and discussion

Amongst the priorities for action of the Sendai framework was an emphasis upon the need for a better understanding of risk so that it could be managed and reduced using strengthened forms of governance with enhanced preparedness and responses both for and by communities (UNISDR, 2015; UN, 2018). It is imperative that development policymakers and practitioners identify factors that have a bearing on coping and adaptation to flood-prone environments and understand the opinions and behaviours of various stakeholders at the local level. Such insights can serve to inform approaches to development that, in dealing with uncertainty, have the flexibility and responsiveness needed to bridge the gap between long-term planning and more immediate and reactive forms of humanitarian action. Given the many vulnerable poor affected by flooding in the Resistencia city region, the literature review looked at theoretical approaches that could be applied to a case study of the area. Firstly, a dichotomy could be seen within the literature in how flooding was being conceptualised which, in turn, impacts upon how the issue is addressed. On the one hand, there are technical approaches focussed on physical factors relating to flooding hazards, though these have a tendency to overlook issues of vulnerability and social and environmental injustice. On the other hand, there are more academic views on risk and vulnerability that have a much greater emphasis upon the political economy associated with flooding, its determining factors, how flooding is experienced and the capacities to address it of those involved. Whilst it became apparent that political economy approaches to flooding more comprehensively considered salient factors, they were not always applicable to considering the coping and adaptation within a flood-prone city region in practice. Consideration was given to which analytical framework would be an appropriate one for exploring the issues faced by the poor in the Resistencia city region to help understand why flooding had not been adequately addressed. The analytical framework of Wamsler and Brink (2015) was identified as suitable given its structured approach is applicable to urban and regional planning, acknowledged the various stages of the disaster cycle and recognised not only physical aspects but also environmental, socio-cultural, economic and political/institutional ones too. So, the chosen framework was tested in the context of the case study of the

Resistencia city region to explore perspectives on hazards, risk, political economy and socio-economic aspects of coping and adaptation for the area from both the view of authorities and that from the grassroots poor flood victims.

In keeping with the Sendai framework priorities for action, then, Chapter 7 presents a discussion of key narrative strands that emerged from analysis of the data presented in the results chapters. Overall, the data revealed a striking difference between top-down perspectives on flooding of authorities in the city region and the bottom-up perspectives on flooding of poor flood victims. The data also showed that, rather than there being full acceptance by authorities of the failure of the top-down approaches to adaptation, there was a tendency for flood victims to be blamed for their vulnerability. In fact, three key themes were identified from the data similar to those presented within the work of Munck (2015) that considered modern-day Latin American politics. Firstly, at the nexus between politics and economics and choices over development, governmental approaches to dealing with flood risk for the Resistencia city region appear to have an orientation towards physical measures without a full recognition of the problems of the vulnerable poor. Secondly, with regard to contestation over the logic for development, institutional structures and mechanisms for the Resistencia city region seem to fail to support the adaptive capacities, solutions and opinions of citizens and fail to successfully integrate them within approaches taken to adaptation to flooding. Thirdly, in terms of the potential for social and political change in the Resistencia city region, there was a view that there was inadequate urban governance and insufficient resourcing and a prevalence of patronage politics and corruption that was foreclosing the potential for transformative approaches to adaptation to flooding and benefitting the rich at the expense of the poor. Each of these themes are discussed below with reference to relevant development literature where considered helpful. N.B. The discussion serves as a basis for the recommendations and conclusion put forward in Chapter 8.

A. Governmental approaches to dealing with flood risk for the Resistencia city region are oriented towards physical measures and do not fully recognise the problems of the vulnerable poor

As mentioned in Chapter 2, a useful pseudo-equation that is commonly referenced within development literature elucidates that risk is a function of hazard and vulnerability (Wisner et al., 2004). Using that convenient conceptual device, it can be said at the outset that it is apparent from the data that the top-down approach towards adaptation of authorities in the Resistencia city region tends to be focused more upon addressing the physical hazard aspect of flooding rather than fully recognising and addressing the associated problems of vulnerability of the poor. To consider further how that theme emerged from the findings and how the imbalance compounds flood risk for the urban poor, section A reflects first upon causes and impacts before considering the limited scope of current governmental approaches to flood risk in the Resistencia city region.

Causes and impacts

Everywhere in the world has its own unique combination of socio-economic, demographic, environmental and political factors at play in relation to risk, and there can be huge variations in the degree of exposure to hazards and their associated vulnerabilities. Whilst environmental and economic processes are global in their reach, their impacts translate into unique flood risks within any particular city region. Major flooding occurred in many parts of the Resistencia city region during the course of the study with the flood waters remaining in situ for many weeks, and many members of the community had to move to alternative accommodation. The semi-structured interviews were an opportunity, then, to gain insights into the impacts of recent experience of significant flooding events. Given their lifestyles more exposed to the elements, it is perhaps unsurprising that slightly higher proportions of poor flood victims mentioned various kinds of natural environmental causes of flooding in their responses compared with professionals and politicians. However, many from both sets of interviewees made reference to local causes of flooding such as the rains, flooding hailing from the local rivers Paraná and Negro and the interconnected system of lagoons that dot the area, and slow drainage because of the low-lying and shallow

nature of the river basin with its high-water table. Many believed that the climate was changing and stated that the rain was increasing in intensity and frequency, and some attributed flooding in the city region to deforestation in Brasil, the release of waters upstream of the Paraná at the Itaipu and Yacyretá dams and the El Niño phenomenon. A key point noted for this thesis is that there was an overall feeling that there was continual risk of flooding and this was being caused by issues outside the region; this concurs with the work of Giddens (2009) which noted the widespread acceptance of the dynamic nature of risk in modern times.

It was apparent that a substantial proportion of the study participants recognised the significance of socio-economic and political factors in strongly influencing the degree to which flooding is experienced in the Resistencia city region. The economic and political fortunes of Argentina have fluctuated greatly in the last hundred years and, since Chaco is one of the poorest provinces in the country, during times of heavy rainfall there are many vulnerable poor within the Resistencia City region who frequently experience flooding of their homes (Munck, 1984; Nouzeilles and Montaldo; 2002; Hedges, 2015). Whilst more well-off could choose to live in flood-prone areas, it was clear from the data that the urban poor tended to live in hazardous flood-prone areas of the Resistencia city region because of economic pressures, and their lack of funds was hampering their attempts at coping and adaptation; this corresponded with the view of Pelling (2011) and Caniglia, Frank and Vallée (2017). Several poor flood victims expressed how they were unable to afford to have their own home in a less hazardous location and/or could not afford suitable adaptation measures. As one poor flood victim noted, perhaps 70% of their neighbourhood had been affected by flooding and it was the experience of many that flood waters had entered their homes and neighbourhoods to a considerable depth and/or seeped up through the floor leading to damp and the loss of possessions such as televisions, beds, furniture and other personal items.

A total of 67.4% of professionals and politicians referred to socio-economic and cultural factors as being causes of flood risk in their responses with mention made of a lack of readiness amongst both politicians and the community, a poor distribution of resources and lack of coordination. It was evident, though, that many professionals and politicians saw those who were flood victims as being, to a significant degree, to

blame for their vulnerability. Many professionals mentioned the rapid growth in urban population and a lack of experience amongst new arrivals to the city, many of whom were perceived to be ignoring government advice in spontaneously infilling and occupying hazardous areas by lagoons. Examples were also cited of the flood defences being weakened by traffic driving upon them and the theft of some parts of them for use as building materials. Overall, there was a perception amongst professionals that there was a lack of education and complacency amongst poor flood victims and a lack of willingness amongst them to leave hazardous and/or flooded areas. Mention was made of the unfinished defence system, pumping stations not working fully, the collapse of existing sewers and a lack of infrastructure such as electricity, sewers and water supply by some professionals and politicians; however, of the total of 88.4% of professionals and politicians who referred to issues of city planning/management as being a cause of flood risk, many were of the view that the flow of water was affected by inadequate drainage systems in both formal and informal building projects and a failure of the community to clear away rubbish.

A proportion of 79.6% of poor flood victims referred to issues of city planning/management as being a cause of flood risk, though as well as mention of systems for drainage and sewage being inadequate, many poor flood victims perceived there was inadequate provision of housing and healthcare facilities. A lower proportion of poor flood victims (55.1%) referred to socio-economic and cultural causes of flood risk in their responses with responses which can be grouped, broadly, into two, i.e. matters of personal behaviour and aspects of marginalisation. In terms of personal behaviour, responses included the perception that risk came from the decision to remain in a hazardous area (whether from wishing to or being compelled to), with concern over dangers to personal security, concern over hygiene, and dangers from the sharing of restricted routes (such as the one road in and out of Antequeras at the time of flooding) by pedestrians, vehicles and roaming animals such as horses, cattle and dogs. In terms of marginalisation, responses of poor flood victims included note of economic difficulties and a lack of alternatives, and a lack of investment in the poor and/or the riverside area. Reference was also made to the inability to afford personal property, the inability to afford suitable measures to adapt existing homes when not in work, and the inability to acquire governmental assistance when living at a place without legal entitlement. In summary, both sets of respondents acknowledge socio-

economic and political aspects and issues of planning and management as being significant influences on the causes of flooding and there is a recognition amongst many that some influencing factors lie beyond the region. However, the poor were more likely to blame systemic failures as being partly responsible for the difficulties they faced and felt that their vulnerability was being overlooked. In contrast, professionals and politicians often expressed the view that there was a general passivity amongst the community with regard to dealing with environmental management issues and were more likely to hold the view that there was a need for stronger control and implementation of existing policy to keep risky flood areas bordering on to lagoons and rivers free of housing. A key point noted for this thesis, then, is that it was apparent that there was a tendency for professionals to apportion a degree of blame for vulnerability to flooding upon the poor flood victims themselves.

Given the rate of urbanisation and the scale of the flooding, many professionals did not seem to be well enough informed of the vulnerabilities of the poor. There was a much higher proportion of poor flood victims that gave detailed responses related to socio-economic and cultural impacts of flooding, i.e. 81.6%. It was noted, for example, that there was a tendency for children and elderly to suffer most from flooding with reference being made to difficulties in accessing health facilities, school or work or in acquiring food and potable water. Several of the poor flood victims interviewed reported that they and/or members of their family had had to move for the duration of a flooding event, with them going to live temporarily with a relative, a friend, in the spare room of a classmate, within a local school or at a makeshift construction at a higher area adjacent to the road. As well as restricted routes being perceived as dangerous due to horses, cattle and dogs sharing a more limited space, note was also made of fear of robbery at home or whilst walking along limited routes at times of flooding. Overall, poor flood victims tended to make far greater mention than the professionals and politicians of the effects that flooding had upon quality of life, their sense of frustration, insecurity and fear. Given the impacts of flooding they had been encountering, many poor flood victims perceived governmental adaptation measures to be inadequate. It seemed clear that authorities were failing to pick up on the insights from poor flood victims.

A number of professionals, particularly those involved in work related to public health, did have a deep understanding of the dangers that flooding posed for health in the city region, and made reference to risks posed from various creatures such as snakes, spiders and scorpions and problems with rats due to poor waste management and dumping. Reference was also made to respiratory and skin diseases, pneumonia and allergies, and the re-emergence of a number of other serious diseases including dengue, leptospirosis, hantavirus, West Nile virus and encephalitis and malnutrition. It was also noted that there could be mental health and emotional problems and trauma for those who are victims of flooding and that accidents (including traffic accidents) could impact upon health during a flooding event. It is noteworthy, however, that only 44.2% of professionals and politicians made reference to socio-economic and cultural impacts in their responses; for the majority, aspects of vulnerability were not their priority concerns.

Whilst the dearth of data at the local level related to flood risk and vulnerability, that was noted in the work of Kamp et al. (2003) and IPCC (2012), also appeared to be the case for the Resistencia city region, 87.8% of poor flood victims did give responses that related to health impacts and disease suffered within the household that they attributed to flooding. Many poor flood victims made reference to flooding leading to the overflow of sewerage systems and the contamination of waters around properties and streets, which put themselves and their families at risk. Many mentioned skin conditions, spots, allergies, stomach illnesses, urinary infection and diseases of the blood and one poor flood victim even referred to an instance of someone dying from electrocution during a recent flooding event. Many poor flood victims mentioned damp in their homes and the incidence of respiratory problems; examples were given of water on the lung, pneumonia, bronchial issues, asthma, flu, fever, colds and arthritis. Various other ailments or challenges noted by poor flood victims included high blood pressure, arthymia, drug taking, issues of personal hygiene, and accidents from stepping into water-filled holes. Concern was expressed over the issue of rubbish and dead animals remaining when flood water had receded, and there was a perception amongst some that the flooded environments did hold potential for harbouring mosquitoes and dengue fever. Given the lifestyles of some, living close to nature, it was perhaps unsurprising to discover that more poor flood victims made reference to infestation from various creatures including rats, snakes, scorpions, frogs, and

insects/ants, as well as the dangers of animals such as cattle, horses and dogs sharing the street. However, it is particularly noteworthy that, compared to professionals and politicians, much more mention was made by poor flood victims of psychological, mental or emotional difficulties brought about flooding, such as fears and worries, stress and depression, difficulties in sleeping and family/domestic problems. Overall, the interviews with poor flood victims elicited more graphic highlighting of the realities and implications of flooding in the city region than professionals and politicians who tended to have a physical orientation in their perspectives. A total of 81.4% of professionals and politicians made reference to the physical impacts of flooding on infrastructure and services within their responses and only 44.2% of them made reference to socio-economic and cultural impacts; this concurs with the predominance of technical, physically-oriented perspectives amongst local authorities noted in the work of Wamsler (2014).

Obviously, further research is needed to acquire further socially-oriented data combined with more efforts to build more effective, synergistic working relationships within local governance so that adaptation measures could be based upon such social data, as suggested by authors such as Twigg (2004), Wisner et al. (2004) and McLaughlin and Dietz (2008). The methodologies employed in collecting data are vitally important and yet, given the complexities involved in the flooding of the Resistencia city region, decision making does not seem to be being informed by socially-oriented contextual data (whether produced professionally or co-produced) to anywhere near the extent required to build a credible shared vision for a shared sustainable, resilient future (Ensor, 2011; Chambers, 2017). A core issue for the region, then, appears to be that a great deal more effort is needed on the part of professionals and politicians to recognise and address the concerns of the vulnerable poor.

The limited scope of current governmental approaches to coping and adaptation to flooding in the Resistencia city region

As noted within Chapter 2, there are a range of potential interventions that could be made by city authorities to reduce risk and vulnerability and enhance coping and

adaptation, and the decisions and actions of planners and authorities warrant particular attention since they contribute to the level of flood risk encountered by different social groups and communities within a local population (Davoudi, Crawford and Mehmood, 2009; Howard, 2009; Wamsler, 2014). Ideally, place-based responsibility, taken to ensure city regions are sustainable, shows consideration for both physical and non-physical aspects of risk to the urban fabric through addressing matters related to adaptation and risk reduction in comprehensive ways that take into account both the needs and adaptive capacities of citizens. Holistic, balanced approaches to risk reduction and adaptation could be achieved with forms of governance for adaptation that are cognisant of the various interrelated physical, environmental, socio-cultural, economic, political/institutional characteristic features of the urban fabric and for various stages in the disaster cycle, as noted in the work of Wamsler (2014) and Wamsler and Brink (2015). However, the data gathered from the professional and politician participants revealed a prominent orientation towards physical aspects within the Resistencia city region, not only in relation to physical impacts as noted in the section above but also in relation to mention of actual measures taken and in terms of suggestions. Indeed, a high proportion of professionals and politicians (81.4%) made suggestions for physical kinds of adaptation measure such as further infrastructure projects.

As Wamsler (2014) remarked, it is common for authorities with responsibility for the planning and management of cities to tend to a modus operandi oriented towards physical aspects on reducing risk with attempts at providing physical solutions such as engineering projects. Likewise, professionals and politicians concentrated within their responses upon technocratic ‘hard measures’ focussed on protection of the city from major flooding of the river Paraná, and there was an overall perception amongst them that the polder system of defences and pumping stations had, by and large, been successful in its objective of addressing riverine flooding. Participant 43, who held a key role in APA, for instance, believed that the engineered system, operated by APA, had been a success and considered there were valuable lessons for other city regions based on the experience of dealing with flooding in Chaco.

Understandably, those professionals and politicians working outside the confines of an office, such as health and social workers and teachers, had more involvement with the community and tended to have a deeper understanding of the impacts of flooding amongst the poor. Several professionals and politicians mentioned the need for better drainage, and a number referred to the recent Resolution 121/2014 to help in avoiding detrimental impacts upon drainage through the control of new construction. A number of professionals did acknowledge that there was an ongoing nature of flood risk for some, especially when several factors occurred together, such as episodes of heavy rain, flood waters due to the control of the Yacyretá dam and the location of vulnerable households near to hazardous lagoons and coastal areas by the River Paraná. However, even though there is a history of major flooding events in the Resistencia city region over several decades, there was little or no mention by professionals of the 'soft measures' that needed to be made amongst the community by poor flood victims themselves to adapt to flooding at the level of the neighbourhood and individual households level. In fact, it was rare for the responses of professionals and politicians to show an understanding of the plight of the most vulnerable.

In theory, even adaptation that is solely focused on physical measures can range across the development cycle from hazard reduction and avoidance to reduction of vulnerability to flooding to preparedness for responding to and recovering from flooding. However, taken as a whole, the professionals and politicians did not tend to express there was an urgent need to prioritise reduction of vulnerability or to put measures in place to enhance preparedness. Little dissatisfaction was expressed by the professionals and politicians with regard to equity of outcomes and effectiveness of physical aspects of reduction and avoidance of hazard; this failure to give due consideration for the lives and livelihoods of the vulnerable poor and the problematic realities they face is a key finding of the thesis from the interview results. Although city authorities for the region tended to concentrate on hazard events and physical measures to combat them, in recent years there has been a failure to keep abreast of the regional demographic and economic situation with its rise in population and increased rate of urbanisation. Despite the construction of the flood defence system, which was primarily intended for protection of the city region from the major flooding from the River Paraná, many thousands of poor people are vulnerable to flooding. With such a scale of social and economic marginalisation, it is apparent that there has

been a failure to plan and implement adaptation projects for sustainability in both ecological and social terms.

Many poor flood victims expressed frustration at the failure of existing defences and pumping stations to prevent flooding of homes, and many spoke of physical measures that they had had to do within the home or its immediate surroundings on an individual or communitarian basis. The engineered defence system was perceived by many poor flood victims as having failed to deal effectively with intense rainfall and the shifts in weather patterns as a result of climate change. Many poor flood victims also remarked upon the failure of flood drains to cope with heavy rainfall. The poor flood victims seemed to be of the view that the government ought to take more responsibility for strategic approaches for adapting to future flooding and, overall, they considered that planning for the city was not very evident and certainly not adequate for keeping pace with the growth in population and the environmental risks faced. In contrast to the view of the professionals and politicians, then, there was an overall perception amongst poor flood victims that regional engineering projects were inadequate and that their own physical measures at the household level were essential for those respondents who had remained in a flooded neighbourhood. There was a clear discernible difference in focus between top-down views of professionals and politicians and views of poor flood victims at the grassroots, and the major gap in relation to perceptions of the effectiveness of the defence system represented a huge problem area. This significant gap in perceptions was identified as a key finding confirming the thesis that those in powerful positions were overlooking a need for improvement in the circumstances of the poorest and most vulnerable.

More holistic and pro-poor approaches to dealing with the complexities of flood risk for the Resistencia city region could be developed through better housing and education programmes and enhanced social policy, for example. Also, with the development and incorporation of more precise assessment of differential patterns of risk amongst the community into policy and practice, the root causes of vulnerability could then be addressed through approaches to adaptation that more fully address both pre- and post-flooding scenarios. Vulnerability assessments, health (physical and mental) impact assessments and social impact assessments of the poor could be undertaken, and assessment of linkages between rural and urban economies and

migration could also help in developing a deeper appreciation of the causes of risk. However, viewed from stance of Munck (2018), discourse at the level of government for dealing with flood risk of in the Resistencia city region could be considered as being led by an orientation towards physical measures as the dominant mode of development, without a full recognition of the problems of the vulnerable poor.

Also, in comparison to the framework of Wamsler and Brink (2015), the conclusion can be drawn that governmental approaches to dealing with flood risk for the Resistencia city region have an imbalanced orientation towards physical measures focussed upon hazard reduction and avoidance without much attention towards the other forms of coping and adaptation that reduce vulnerability and foster preparedness to both responding to and recovering from flooding. Holistic, balanced approaches to risk reduction and adaptation could be achieved with forms of urban planning that are cognisant of the various interrelated physical, environmental, socio-cultural, economic, political/institutional characteristic features of the urban fabric; as noted in the work of Wamsler (2014) and Wamsler and Brink (2015). As well as fostering social cohesion and promoting public health and wellbeing, balance in urban and regional planning and management could potentially work within ecological limitations. Unsurprisingly perhaps, given that many flood victims considered themselves as being accustomed to living close to nature, some of their responses showed their close relationship to regional flora and fauna. The poor tended to mention the need for greater control of animals and insects, both before and after flooding, and the use of rat traps because of infestation following flooding episodes, and many recognised the importance of frequent cleaning/disinfecting in and around homes. Despite the seemingly harsh realities and vulnerabilities for those living in areas with a high level of flood risk, many choose their way of life close to nature with easy access to opportunities for fishing. However, by and large, there was little emphasis placed on working in harmony with nature within the responses from either set of participants; few comments were made in relation to environmental measures that could have been taken either to reduce and avoid hazard, reduce vulnerability or to prepare to respond to, or recover from, flooding.

As with the findings of Pelling (2011), the evidence of this research showed that the poorest in the Resistencia city region are those who perceive themselves to be most

likely at risk of flooding. Poor flood victims spoke often of the homespun 'soft measures' they had had to take, and they tended to perceive the failure of city authorities to reduce vulnerability as being a great injustice. The overall sentiment of poor flood victims was that the government needed to take more robust and responsive approaches to dealing with flooding in the future in ways that kept pace with urbanisation and were more fully cognisant of the conditions encountered by the vulnerable poor. There was an overall sentiment amongst the poor that there needed to be more of a focus on housing rather than expensive infrastructure projects, with more done to provide housing settlements in readiness for evacuees from flooding events. It is clearly apparent from the findings that the problems and vulnerabilities of the poor have been going unrecognised by city authorities. Overall, the responses of poor flood victims reflected a general disappointment with the role being played by national, regional and local government in addressing the issues of flooding for Chaco. There was a perception amongst many poor flood victims that there was a complacency amongst engineers with regard to the efficacy of the defences and pumps and that the area suffered from malpractice on the part of the municipal government, with many perceiving there to be a failure to implement sound policy. Some not only mentioned a perceived lack of a pro-poor focus from local government, but that the province as a whole was not a priority for national government. Some considered that, in the light of rapid urbanisation / population growth, the government approach to planning was simply not robust enough and that there seemed to be short-term thinking and a lack of vision.

Many poor flood victims expressed a wish for local government to focus measures more upon ongoing flooding as a result of intense rainfall and the shifts in weather patterns as a result of climate change. Also, rather than large infrastructure projects, many poor flood victims also expressed a wish for more social housing. However, the greatest number of responses of poor flood victims referred to a need for more and better drainage and sewage systems and better maintenance and cleaning of existing infrastructure to optimise its functionality. Flood drains are in existence in many parts of the city region, however, it was considered that they ought to be better maintained and expanded to more adequately cope with the rainfall. The views of poor flood victims tended to stress the need for the government to take a more pro-poor focus with a greater awareness of what happens to households in areas of flooding at the

actual time of flooding. An overall clear message from the interviews was that poor flood victims were disappointed with respect to the waste management of their areas and many bemoaned the failure to remove rubbish from drains in time to prevent flooding.

B. Institutional structures and mechanisms for the Resistencia city region fail to support the adaptive capacities, solutions and opinions of citizens and fail to successfully integrate them in approaches to adaptation to flooding

To consider how the assertion that institutional structures and mechanisms for the Resistencia city region fail to support the adaptive capacities, solutions and opinions of citizens and fail to successfully integrate them in approaches to adaptation to flooding emerged from the findings, section B reflects upon adaptive capacity and resilience and the limited role of participatory approaches in coping and adaptation for the Resistencia city region.

Adaptive capacity and resilience

As noted in Chapter 2, the capabilities of people are a key aspect of adaptation, especially when technocratic measures have proved inadequate (Wisner et al., 2004; McLaughlin and Dietz, 2008; Moench, 2009). As environments change, the agency and capacities that have been accumulated by a community over time can prove critical (Sen, 1999). As such, awareness of the capacities and social capital within the Resistencia city region can help inform more sustainable and pro-poor forms of planning and management and adaptation to flooding (Pelling, 2011; IPCC, 2012; O'Brien and O'Keefe, 2014; Ensor et al., 2015; Wamsler and Blink, 2015). For the Resistencia city region, there is a particular history of adaptation to flooding which has witnessed the 'parallel worlds' of the formal, technical/managerial measures taken by city authorities and the coping and adaptation measures taken by citizens. It was appreciated by some professionals and politicians that spontaneous occupation of

hazardous land was a livelihood strategy and, interestingly, it was noted that that was done by both rich and poor alike. A few professionals and politicians made comments that referred to the build-up of a collective consciousness of flooding over years, and those who worked more closely with the community, such as teachers of pupils who had suffered flooding, tended to have stronger opinions, deeper insight and understanding and seemingly more sympathy with regard to the plight of the poor than others. For example, Participant 41, a head teacher, seemed aware of the coping skills that the poor needed to draw upon in dealing with flooding, and Participant 1, a planner of the municipal council of Resistencia, noted that an interdisciplinary team had been working with the Toba Indian community. Some acknowledged that protection of belongings for security reasons was a reason for members of the community staying behind in a flooded area, whilst note was also made of provision of help in construction and help in moving animals/livestock and the provision of medicines and vaccines, temporary shelter, vehicles, mattresses, and groceries during flooding events. However, mention of the adaptive capacities of the poor by the professional and politicians was rare. On the whole, there was little recognition of the socio-cultural aspects in the avoidance or reduction of flooding hazard by professionals and politicians; their responses were more likely to be disparaging towards the poor in mentioning the blocking of streets in political protest, a lack of education, poor take-up of vaccines and the need for better communication with regard to the risks of flooding.

A high proportion total the professionals and politicians (86%) made suggestions for more support through provision of water, latrines, mobile generators and recreation areas for children and the need for more training to enable a deeper understanding of the environment and different cultures. A number of the professionals and politicians did mention a need for awareness raising of the risks involved in living in areas prone to flooding and better preparations for schools and other institutions, with one teacher, in particular, believing there ought to be resourcing of an education programme to help provide a more holistic understanding of health and sustainable development. Some of the professionals and politicians, especially those working with social services, did seem of the view that approaches to planning for the city region ought to be more pro-poor with a greater focus on the provision of land and secure housing. A participant also suggested that relevant salaried work should be provided for flood victims to help

with adaptation measures. However, whilst suggestions were made for a need for improvements to humanitarian aid, there seemed to be a sentiment amongst many professionals and politicians that measures were working fairly well and that those who occupied hazardous areas, contrary to flood zone guidelines, were, in part at least, to blame for their misfortune.

It could be said that, whilst professionals and politicians were keen to offer their suggestions, the poor flood victims themselves had greater insights of the environmental and economic realities being faced. Clearly, livelihood and cultural factors are a very significant driver in terms of why people live where they do and several poor flood victims, living close to the river, originated from the area and had a close connection to fishing with many being accustomed to a life close to nature with frequently occurring flooding. Recent migration to the Resistencia city region for work and/or study was also the story of many of the poor flood victims. There was, in fact, a wide variety of views forthcoming from poor flood victims, with a very high proportion of them (97%) making responses that related in some respect to social capital and resilience. Note was made of the difficulties in accessing assistance from government, perhaps due to legal status in land occupation, the importance of active citizenship and of keeping areas clean and the bolstering of resilience through livelihood strategies such as taking on various forms of employment. Many poor flood victims did acknowledge the humanitarian assistance of the authorities, such as help with construction materials and the provision of a truck by the army to help move belongings to a neighbouring school that was acting as a temporary shelter. However, many expressed a need to take measures for their households themselves rather than rely on the assistance of the authorities, with some participants and/or their family members moving to live with a family member or friend, whilst others made reference to their employers helping them with temporary accommodation at the time of flooding.

Amongst those who had remained at home during times of flooding, often with a view to protecting belongings, responses revealed a range of adaptation measures and many participants showed their resilience and resourcefulness in respect to attempting to cope with the difficult circumstances encountered. Examples given included having a supply of wood for the future raising of belongings, the stocking of food and water,

the acquisition of pumps, preparations to live by the main road, having a caravan ready to tow away and live in if necessary, having a boat to check on flooded property, the acquiring of boots, the unplugging of electrical equipment at times of heavy rain, the use of rugs rather than carpets so that they could be rolled up, attempts to keep clothes and furniture dry and frequent cleaning/disinfecting. Whilst many acknowledged the state assistance provided, many saw it as inadequate or poorly distributed. Many more noted the helpfulness of the neighbouring community and tended to stress a communitarian perspective and the importance of mutual help in relation to various matters such as forewarning of flooding, moving and securing property and belongings and provision of alternative accommodation. Indeed, it was clearly apparent from the findings that poor flood victims were more keenly aware of the value to them of the generosity and cooperation of family, mutual help amongst close-knit neighbours and the vital help of faith groups in bolstering their resilience and enhancing a sense of security. It was suggested that there was a need for more support through provision of water, latrines and recreation areas for children. Some perceived there to be a lack of provision of housing and/or suitable locations for housing and several responses referred to cuts in electricity and difficulties or challenges in accessing potable water; mention was made of demonstrators having blocked the highway in protest against the conditions. Overall, the responses of poor flood victims tended to reveal that they were preoccupied with day-to-day livelihood strategies and had a sense of bewilderment at the lack of assistance and lack of continuity in government approaches to flooding with a sense that no one seemed to be in charge in relation to flooding events. An overall feeling of the poor flood victims was that assistance from the authorities was inadequate and, given the scale of the problems involved, the authorities could not be relied upon. However, on the whole, neighbourhoods were seen as close-knit, peaceful and the resilience of neighbours was maintained through a humble and cooperative lifestyle close to nature. Each household noted its own particular problems and challenges, and preparations for responding to flooding by the community were seen as vital through different responses to their environmental and economic circumstances. The problems of the poor and the limitations of their ability to respond seemed, in part, due to the constraints of the system. It is clearly apparent, then, that there is a need for support for the adaptive capacity of citizens in complementary ways that bolster the efforts at adaptation of the

community whilst simultaneously feeding into regional approaches to flood risk taken by formal authorities.

The limited role of participatory approaches in coping and adaptation in the Resistencia city region

Given the complexity of adaptation, analysis of the political economy for a city region ought to give consideration for whether or not formal approaches to coping and adaptation to flooding are sustainable, pro-poor and foster meaningful accommodation of a variety of stakeholders within planning processes (Chambers, 2017). Clearly, there are borders and limits between the actions and responsibilities of individuals and institutions with regard to civic matters such as adaptation to flooding; however, as Munck (2015) noted, the logic over development can be contested, and consent can be generated by the powerful through the use of their interactions with the general public. So, a key aspect for consideration are the power relations between the social actors responsible for adaptation measures and the degree to which any formal processes for public participation are meaningful and genuine. A label of 'public participation' is not an instant recipe for success for governmental approaches to flooding. However, genuine forms of participatory planning and engagement, especially in times of increasing uncertainty, could enable those at the grassroots level to share their insights on flooding, and their adaptive capacity, social capital and resilience could make a valuable contribution in the development of formal approaches to coping and adaptation to flooding for their area. Clearly, the vulnerable poor at the grassroots level could make a significant contribution to the design of formal approaches to adaptation to the risk of flooding if they had the opportunity.

In reality, it is often the case that formal approaches to coping and adaptation to flooding for a city region are predominantly technocratic with an orientation towards 'blueprint' styles of urban governance, with imposed regulations and an accompanying expectation of adherence to them. As noted in section A, it appears to be the case that top-down, physically-oriented perspectives on planning and management are predominant amongst authorities in the Resistencia city region with high level discourse and discussions tending to focus on physical aspects to reducing risk, as was noted in the work of Wamsler (2014). However, following years of

economic crisis in Argentina, many have campaigned for new, pre-figurative forms of horizontal political relations. In keeping with such campaigns, the participants were pointedly steered towards expressing views with regard to engagement in civic approaches to adaptation to flood risk in the Resistencia city region and their opinions on the extent and quality of such participation. Of the 49 poor flood victims interviewed, 83.7% of them made some reference to the topic of planning and/or involvement in collaborative efforts within a planning or water management authority project, programme, collaboration or consultation exercise in some respect. Many felt there were no existing opportunities to be involved in planning, with several referring to there being a perceived distance between government authorities and the community, and a lack of cooperation. Government processes with respect to adaptation were perceived by many as being closed, and the impression was given that the government was simply not listening and that, currently, there was little opportunity for public engagement. So, as well as the problems and vulnerabilities of the poor seemingly going unrecognised by city authorities, as noted in Section A, the marginalisation of the grassroots is compounded by a feeling amongst them that government approaches to adaptation lacked inclusivity. A number of poor flood victims referred to regional planning as being unsound with poor implementation of existing policies, and any approaches to participation that are available are seen as limited and/or of poor quality. Participant 46 of Resistencia, for example, mentioned that although there had been some consultative meetings in her neighbourhood, attendance at them had been low and people may have gone along simply to beg for materials. A number of participants mentioned their involvement in supposedly participatory or collaborative projects, though they believed that no consequent governmental action had been forthcoming following their efforts. Participant 26 of Resistencia expressed the belief that those in power simply did not wish to relinquish that power. Overall, poor flood victims considered there to be a little or no opportunities for public engagement in governmental approaches to planning and where there had been some consultation exercises these were considered to have been inadequate. At best, based upon the ladder of participation of Arnstein (1969), the consultation processes within the Resistencia city region can be considered as tokenistic. It seems apparent that insights of poor flood victims are being missed because of inadequate political processes and a sense of lack of cooperation of the authorities, and the sense of distance between the authorities and the community seems

to contribute to a sense of disenfranchisement amongst the poor. The data of this study supports the view that although limited participatory approaches have been employed by governmental authorities in the Resistencia city region, they have been such that the opinions of the poor have been overlooked, and the influence that the general public has had upon government policy has been negligible. Taken from the stance of discourse analysis of Fairclough (2001), top-down conceptualisations of planning for the Resistencia city region did not appear to be set up in the interests of the vulnerable poor.

Whilst many had a lack of faith in the capacity and intent of the government, it was still clear from the data, however, that poor flood victims wanted to engage more fully in adaptation measures for their neighbourhoods if the political processes were genuine and if account was taken of their views with real follow-up actions taken based upon their involvement**.** Even though opportunity for engagement in suitable formal projects was perceived as being limited, the semi-structured interviews revealed the particularly salient point that many poor flood victims valued the role of community activism; in general, it was clearly apparent that poor flood victims wished to participate in civic life and be more involved in the planning of their neighbourhoods and/or the city region. The point was made by poor flood victims that unused capacities within the community could be beneficial in more participatory approaches, though note was also made of some of the opportunities, challenges and logistical difficulties that such involvement may entail. The issue of availability or ease of involvement in a participatory event or process was raised with, for example, one poor flood victim mentioning that he would be more available to participate in planning now he was retired, another mentioning being too busy all day and yet another saying she was happy to be involved in public works through the church though did not wish to participate directly with politicians.

Almost half of the professionals and politicians interviewed worked directly within a planning department of a municipal council or a provincial water management authority department in formal roles related to flood risk including planners and emergency management workers/trainers, water management engineers, a research assistant and a lawyer. A total of 76.7% of the professionals and politicians made mention of, or expressed involvement in, planning and/or collaborative efforts within

a planning or water management authority project, programme, collaboration or consultation exercise in some respect. Whilst it was reported that there had been occasional training of the community in the building of temporary shelters, a perception emerged of a need for establishment of fresh approaches to flood risk. Several professionals and politicians expressed frustration at a planning system that they considered to be ineffective and chaotic, and many expressed the need for greater coordination between the municipal and provincial governments and between the province and the national government. The belief was expressed by some that there ought to be better facilitation of public participation within the planning system, especially for those living outside the defences. Viewed as a whole, it was apparent, then, that the majority of the combined total of both sets of interviewees did believe that greater degrees of participation of the public in planning would be beneficial. However, given the limited scope and/or quality of current political processes with regard to adaptation to flooding, the opportunity for poor flood victims to respond to their circumstances effectively through formal channels is generally constrained and, instead, they feel they need to put their efforts into finding their own solutions. The conclusion can be drawn that institutional structures and mechanisms for the Resistencia city region currently fail to support the adaptive capacities, solutions and opinions of citizens and fail to successfully integrate them in approaches to adaptation to flooding, however there is a strong desire for change.

C. Inadequate urban and regional governance, insufficient resourcing and the prevalence of patronage politics and corruption foreclose transformative approaches to adaptation to flooding and benefit the rich at the expense of the poor in the Resistencia city region

To consider how the argument that inadequate urban and regional governance, insufficient resourcing and the prevalence of patronage politics and corruption foreclose transformative approaches to adaptation to flooding and benefit the rich at the expense of the poor in the Resistencia city region emerged from the findings, section C reflects upon three primary sorts of failing: perceptions that inadequate urban and regional governance for risk reduction leads to vulnerability; perceptions that lack of resources leads to vulnerability; and perceptions that corruption leads to vulnerability. Each of these perceived determinants of flood risk are now discussed briefly in turn.

Perceptions that inadequate urban and regional governance for risk reduction leads to vulnerability

With the challenges of prioritisation and competing demands over resources for the Resistencia city region, the situation seems ripe for more enhanced forms of planning for resilience to flooding that are more effective in addressing vulnerability and that are cost effective. Many professionals and politicians had noted the importance of suitable planning and made reference to the flood risk map, prepared with close work with consultants from the private sector and authorised by government in Resolution 1111/98, that acts as a guide for development, and which is accompanied by the power of APA to remove unauthorised occupiers of land at risk of flooding, authorised in Resolution 1111/97. A number of professionals and politicians also referred to the recent Resolution 121/2014 to help in controlling the construction of new buildings and to help in avoiding detrimental impacts upon drainage, though a number still noted a need for better control to ensure the provision of drainage and sewerage systems

prior to construction rather than in a haphazard fashion. Many professionals and politicians, in fact, believed that implementation of flood risk policy was poor and, overall, it was apparent that many acknowledged that current approaches to planning and management were inadequate to address the risks facing the rapidly urbanising city region. Some would welcome more serious approaches for community participation within the planning process and better coordination between technical teams, and it was considered that better control of infilling on prohibited lands and the building of houses without services would also have public health benefits. As well as noting the authority of APA with regard to the management of flood risk zones, it was noted that the organisation evaluates and monitors water levels, handling both hydrological and meteorological data, and alerts relevant agencies when there is a flood warning, and notifies the public through the use of a website, the radio and newspapers. Emergency management workers / trainers amongst the interviewees, who were working at municipal councils, also mentioned support given through the collection of an evidence base and the existence of a Plan of Evacuation for Chaco. In general, the views of professionals and politicians were mixed in the sense that some more readily acknowledged the need for improved approaches to adaptation, whilst many others were quicker to apportion blame for difficulties upon the poor. Some noted a need for improved longer-term planning and management of the city region with better funding, enhanced participation, improved coordination between different levels of government, collection of statistics and better communication of health messages. On the other hand, some stressed a need for stronger control and implementation of existing policy to keep risky flood areas bordering on to lagoons and rivers free of housing. Taken as a whole, the views of professionals and politicians tended not to reflect as urgent a need for more measures to reduce vulnerability as the responses of the poor flood victims did.

As outlined in section A, it seems clear that there is a physical orientation towards coping and risk reduction, with the design and maintenance of the flood protection embankments and pumping stations perceived by many poor flood victims as failing to deal fully with ongoing flooding at times of heavy rainfall, despite the expense of their construction (funded through international development loans). In fact, the urban governance for risk reduction for the Resistencia city region was perceived to be inadequate by poor flood victims on a number of levels. Not only did they often

express a need to prepare at the personal or household level, a number of poor flood victims also suggested there was a need for specific plans for infrastructure, the provision of adequate energy and lighting, and programmes for house building and efforts to deal with insects both before and after flooding. From the range of ideas put forward by poor flood victims, many responses made reference to the modus operandi of the government with the suggestion that the public sector ought to take more responsibility, be more organised and be more prepared for future flooding. Amongst their responses was expression of a belief in the need for a longer-term view, vision and better planning for low lying areas with improvement in the collection of relevant statistics. Mention was made of some interest being shown in flooded areas by authorities though the processes were perceived as being of dubious quality with little or no follow-up action. Instead, poor flood victims tended to stress there was a need for the government to take a more pro-poor focus and the point was made that there needed to be more awareness of what happens to households in areas of flooding at the actual time of flooding, rather than just paying attention to such neighbourhoods when canvassing for votes. Responses also suggested the need for establishment of a Commission of Emergencies. It was clear, then, in concurrence with the view of commentators such as Kamp et al. (2003) and Pelling (2011), that many believed in a need for coping and adaptation measures to be better informed by better data.

Some participants from both groups of interviewees suggested a need for research and education with respect to strategic adaptation measures; a number of participants saw that there was a need for programmes of consciousness raising/education in relation to environmental management or sustainable development. Various responses expressed a wish for the government to take a more pro-poor focus, with some suggesting work should be provided for young people. More reference was made by poor flood victims to political demonstrations, such as the blocking of roads, to bring attention to their plight. Interestingly, a poor flood victim mentioned his acquiring of housing from a political party in return for his activism. It is clearly apparent from the findings, however, that there is a great divergence between ‘top-down’ perspectives of city authorities and the perspectives of the grassroots. For the poor flood victims, government approaches seemed to be incompetent, lacking in vision and strategy, reactionary, beset with short-term thinking and lacking in focus on helping the poor of the region. Many thought that the situation with regard to flooding was not being

addressed, let alone solved. Overall, there seemed to be a perception amongst poor flood victims that the government ought to be more organised, more willing to engage with vulnerable populations and more focussed on taking responsibility for strategic approaches to adapting to future flooding and less complacent. In general, it was clear that poor flood victims perceived that the government had to improve hugely if a more responsible approach to vulnerability reduction and preparedness to responding and recovering from flooding was to be taken in the future.

Some participants, from both groups of interviewees, believed that there was a need to see how the problem of flooding was being dealt with in other provinces and countries by means of an interchange of ideas. The belief was expressed by some that more strategic and inter-disciplinary approaches in dealing with flood risk were needed, especially for those living outside the defences**.** It was noted from numerous responses that sound town planning required broad involvement of stakeholders with sharing of ideas and experiences across both provincial and national borders. Indeed, it was perceived by poor flood victims, and acknowledged by a number of professionals and politicians, that as well as a need for better work with the community, there was also a need for better working relationships, collaboration and coordination amongst various stakeholders and professionals working in different sectors, both before and following major flooding events; this key finding from the field research concurs with the work of Pelling (2011), Sullivan and Skelcher (2002) and Wamsler (2014) mentioned in Chapter 2. Better collaborative working practices, with a greater appreciation of the perspectives and actions of a variety of stakeholders could help planning for coping and adaptation to flooding in the Resistencia city region to be better informed, more balanced, more responsive to the needs of the vulnerable poor and better equipped to address both current and emerging risks (Pelling, 2011).

As Wamsler (2014) noted, consideration can be given to the degree to which collaboration has been embedded into the practices of various sectors relevant to coping and adaptation. A key figure working for APA noted that strategic adaptation measures for the city region had been achieved through collaboration that was both transboundary and between professional disciplines. Mention was also made of an

interdepartmental group to deal with crises composed, in part, by the Civil Defence, the Emergency Committee and the Public Works department of the municipal councils and others. A professional also noted that there was a programme called PROMEBA for improving the quality of life of the vulnerable. Whilst there was some mention of collaboration between organisations, cooperation between different organisations and sectors, to harmonise managerial approaches to adaptation and risk reduction and capacity building of the urban actors involved, was considered weak with infrequent meetings. There appeared to be an absence of embedding of collaborative practices focused upon adaptation and reduction of flood risk for the Resistencia city region. Programme work for the professionals and politicians interviewed, whilst aimed at reducing the physical impacts of flood risk, did not on the whole seem to be modified to have a focus upon collaborative practice. Collaboration was not mentioned as being an integral part of the structure, policies, legislation and implementation of the work of the organisations of those interviewed. Furthermore, there was little mention of collaboration to ensure continuous functioning of organisations were a flooding event to occur. Interestingly, a key engineer in relation to flooding noted that many of those with expertise and experience gained during the major flooding of the 1980s were ageing and/or close to retirement. As such, to help with continuity, he considered that there needed to be further capacity building, greater clarification of roles and responsibilities and the need for a protocol for action for dealing with emergencies in the future. An educational aspect to dealing with flooding, ripe for collaboration, was also noted by a head teacher from a school with many flood victims since she strongly believed there was a need for more teaching with regard to sustainable development and the implications of flooding. Despite these views, and despite many considering coordination amongst stakeholders to be poor, the professionals and politicians, as a whole, did not seem to accept or assert that collaboration for pro-poor forms of adaptation and risk reduction was an integral aspect of their professional responsibilities and activities. From the findings, it seems that all the five aspects of mainstreaming noted in the work of Wamsler (2014) mentioned in Chapter 2 need to be developed for collaboration for adaptation in the Resistencia city region; however, of particular note here for our discussion, it seems that the interorganisational aspect to coping and adaptation is poorly developed or implemented.

Whilst holistic and collaborative approaches have been encouraged for a number of years in the work of a number of writers on international development and the environment (see, for example, Nederveen Pieterse, 1999, 2001; Tucker, 1999; Shiva, 2008 and Adams, 2009), they call for the political acceptance of the appropriate modus operandi for the relevant institutions of urban and regional governance. The analysis of the findings suggests that there is an appetite for such a paradigm shift for the Resistencia city region to more collaborative forms of holistic and responsive intervention for coping and adaptation, that are beneficial in both the short-term and longer-term. Several participants expressed a wish that those in government had a greater appreciation of the hinterland and economy of the city region, the processes of rural to urban migration and the causes of risk and vulnerability. It is clear that urban governance for risk reduction in the Resistencia city region has not been sufficiently socially-oriented and has lacked adequate engagement with, and support for, the socially excluded. However, numerous responses spoke of a need for more collaborative and sustainable forms of integrated urban governance that more effectively address social vulnerabilities and health inequalities.

Both in terms of plan coverage and implementation, environmental planning in relation to flooding in the Resistencia city region appears to have mirrored the recent experience of flooding in Buenos Aries and the Santa Fe city region of Argentina; see, for example, Hardoy and Pandiella (2009). From an organisational/managerial perspective, there is a perception amongst professionals and politicians that local government for the Resistencia city region requires a greater focus on disaster risk reduction within planning, with more robust upholding of environmental standards in the development of the city region. Whilst professionals concentrated upon hazard events, the physical measures to combat these, and the need for better implementation of land use regulations, of the 79.6% of poor flood victims that referred to issues of city planning/management, many more emphasised that flood adaptation needed to work in tandem with social policy with regard for the difficulties faced by the poor. There was widespread perception amongst the community that other coherent approaches needed to be utilised in addition to the focus upon engineering works. Many of the poor expressed a wish for a more responsible approach on the part of local government to cleaning and maintenance, with improvement of road surfaces and greater provision of materials for those who need them, to raise ground levels.

However, government approaches with regard to responding to flooding were seen by many poor flood victims as being lacking in strategy, ill-prepared and/or reactionary.

Reorganisation to more holistic and collaborative forms of urban governance for risk reduction does not necessarily require a great deal more funding though it could be hugely beneficial. However, failure of authorities to successfully overcome vulnerability for the poor in the Resistencia city region looks set to lead to a progressive worsening of disaster risk in the years to come. As PFV Participant 25 of Barranqueras poignantly noted**,** there is a need for optimism and positivity; however, in general, many thought that the public sector did not take a sufficiently responsible approach and needed to be more organised, more prepared in respect to various aspects of pre- and post-flooding, and more willing to accommodate various stakeholders working together.

Perceptions that lack of resources leads to vulnerability

As noted within the literature review in Chapter 2, vulnerability is a multifaceted concept that reflects the potential for adverse impacts or losses amongst various social groups (Alexander, 2000; Pelling, 2011). The vulnerable urban poor tend to be subject to economic pressure to live in hazardous, flood-prone locations and are more likely to suffer the impacts of flooding, with a lack of financial resources hampering attempts to prepare, cope and/or recover, even from relatively small flood events (Pelling and Wisner, 2009; Caniglia, Frank and Vallée, 2017). The findings confirmed that the poorest in the Resistencia city region were perceived as being most likely to suffer from the impacts of flooding. The failure of authorities in the Resistencia city region to reduce the considerable inequalities in terms of vulnerability to flooding was considered a great injustice by citizens. As in any sphere of political life, there can be 'winners' and 'losers' due to approaches taken to coping and adaptation to flooding and, as noted in the literature review, urban agendas with a technocratic bias towards physical impacts, such as in the Resistencia city region, can, in their selection of priorities, favour some more than others.

Just over half (51.2%) of the professionals and politicians referred to existing socio-economic and cultural aspects within their responses. A National Highways engineer

and his administrative assistant, Participant 28 and Participant 26, respectively, stressed the importance for the economy of preparations to keep traffic flowing on the road network during times of heavy rainfall and flooding. The offices of city authorities were perceived by a number of professionals and politicians as being under-resourced, both financially and in terms of human resources, with a lack of computers, cameras and vehicles, and there was a perceived need for enhanced capacity for collection of statistics and more training and capacity building amongst staff. Reference to economic aspects to reduction and avoidance of flood hazards or preparedness of responding to flooding were, however, limited. Whilst a sympathetic politician stressed that consideration ought to be given to the wider regional economic picture, and another professional suggested that relevant salaried work ought to be provided for flood victims to help with adaptation measures, overall, the professionals and politicians made little mention of economic aspects of reducing vulnerability amongst the poor.

On the other hand, a much higher proportion of poor flood victims (83.7%) made some sort reference to a socio-economic dimension to the challenges they faced. Many acknowledged the humanitarian assistance received at the time of flooding including provision of food, water, clothing and medicines and help from the army in moving belongings to a neighbouring school that was serving as a temporary shelter. Also, mention was made of the help of government staff to construct temporary housing, the provision of a mobile health unit and toilet and the provision of construction materials. Overall, however, there seemed to be the perception amongst many poor flood victims that governmental assistance was very little, and that there was a heavy reliance on the generosity and cooperation of family, neighbours, employers and faith groups. As such, many noted the community spirit amongst neighbours and family who were helpful, charitable and/or cooperative in sharing bread, milk and water, for example. Generally, the responses revealed that the ensuring of the maintenance or enhancement of personal capital, through cohesive networks of support in the community and through sound family ties, was very much in evidence in the Resistencia city region. Various forms of cooperative behaviour were mentioned such as the gift of a pump, the use of a vehicle to acquire drinking water or help in constructing temporary accommodation. The example of one poor flood victim acquiring certification from the police to act as confirmation to an employer that absence from work was, indeed,

due to flooding is symptomatic of the widespread economic precariousness when flooding occurs. A poor flood victim mentioned her strategy of occupying an abandoned and dilapidated house, making clandestine connections to utilities through the help of a neighbour and delaying investment in works to that house in case the owner were to have re-emerged.

Several participants lived close to the river as they were originally from the area, and a significant economic driver for living in such a hazardous area was their own strategy of making a living from fishing. Some noted that they had acquired work in the city centre to save to improve their circumstances. Clearly, choices for vulnerable people can be particularly restricted if unemployed and living in an area where the informal economy is weak or non-existent. Many poor flood victims expressed a wish for the government to take a more pro-poor focus, with some specifically saying there was a need to help the young. Mention was made of government debt and lack of investment with the government tending to support business/commercial interests rather than the vulnerable poor. One poor flood victim suggested that there ought to be greater community control over the budget, however there was little mention of the economic implications of measures to reduce and avoid flooding other than comment on under-resourcing and corruption. Many were keenly aware that they had little choice other than to build their own house in hazardous areas, and there was a sense that the government cared little, especially for those living beyond the defences of the city region. The overall sentiment of poor flood victims was that Chaco was in need of a lot of economic help though the government tended to support business rather than the vulnerable poor. Several suggested there was a need for an increase in the government budget, more investment in riverside areas and better distribution of assistance with a focus on helping the most vulnerable, with the point made that strategic approaches saved money in the long run. Clearly, the provision of more economic resources requires political will for allocation of sufficient funding. Participants varied in the degree to which they considered there would be financial improvements following the election victory of the centre-right politician Macri during the period of data collection in 2015. However, it was clear that there was a widespread perception amongst citizens that there needed to be better handling of governmental budgets and that public sector funding needed to be more purposefully focused on overcoming vulnerability to flooding.

Perceptions that corruption leads to vulnerability

As well as the aforementioned economic aspects, there were strongly held views amongst participants with regard to a perceived failure of city authorities to perform civic duties to address flooding in the Resistencia city region because of corruption. It was apparent that corruption was perceived by many to be a prominent issue in Chaco and so it was placed on the semi-structured guide as an issue warranting a question. Although concern over corruption was widespread, there was a marked difference between the opinions of the professionals and politicians and those of poor flood victims in that regard. Some strong opinions regarding malpractice were put forward by a number of professionals and politicians, ranging from a milder perception that there was a general shortfall in coordinated action to stronger feelings that jealousies and lack of cooperation were hampering development. An even stronger view was put forward that the level of corruption was akin to a 'civil war' with certain opportunistic politicians buying votes at election time and keen to take advantage of flooding for personal gain. One academic mentioned that people were being giving public sector posts without suitable educational qualifications. A politician spoke of government favouring big business and recollected that there was a failure to prosecute when there was a huge project failure years before and also expressed the belief that statistics with regard to death rates were being hidden. However, only 34.9% of the professionals and politicians made some reference to corruption, perhaps due to the sensitive nature of the theme for those holding public office. On the other hand, a total of 91.8% of poor flood victims expressed various degrees of concern at the perceived corruption at work in local government. Several expressed a lack of faith in the approach of the local government, believing it made promises though accomplished nothing and seemed to merely offer pretentious shows of interest in their plight, most notably when it was election time. There was the belief that the government for the city region was in considerable debt, that administrative delays were common, that those working in local government had little sense of responsibility and failed to gather sufficient statistics with regard to flooding. Many poor flood victims considered that nepotism was endemic, with friends, family and those of the same political persuasion more likely to be prioritised for assistance. Furthermore, several participants spoke of clear examples of corrupt and/or criminal activities ranging from petty theft to systematic bribery and widespread corruption in the region and the nation as a whole.

Government was considered by some to be furthering the interests of big business, and a number of participants believed that funding for dealing with flooding was not reaching the right people.

Clearly, achieving reductions in the levels of corruption is a matter requiring the political will for more careful scrutiny of political processes. Macri won the national election of 2015 on a centre-right, anti-corruption ticket and participants varied in the degree to which they considered there would be a sufficient cultural shift to alter the deeply engrained nature of corruption within Argentinian political and economic life. It is beyond the scope of this thesis to propound ways in which a cultural shift can be encouraged for more appropriate distribution and handling of governmental budgets; however, suffice it to say there was a widespread perception amongst citizens that there was a pressing need to overcome corruption. Overall, based upon the perspective of Munck (2018), the approaches to adaptation could be considered to be failing to accommodate counter-hegemonic perspectives on development to facilitate the pro-poor social and political changes needed to cope with current and future risks. Based on the discussion of section C, it can be concluded that inadequate urban and regional governance, insufficient resourcing and the prevalence of patronage politics and corruption are foreclosing potentially transformative approaches to adaptation to flooding.

Overall, it seems apparent that local government bureaucracies have resisted change to their modus operandi, dressed-up their decisions in a language of bureaucracy and technical matters and sought to represent the interests of the rich and connected at the expense of the socially and economically marginalised of the Resistencia city region. In practice, there has been a failure to find a 'common language' to discuss and prioritise health and sustainable development related matters (Cleaver, 2001; Howell and Pearce, 2001; Berkeley and Springett, 2006a; 2006b). Along with the extreme differentiation of deprivation, a variety of socio-cultural, economic and political factors have had a bearing on the physical and psychological access to resources and political processes in the Resistencia city region. Programmes and projects designed to facilitate local community participation have, in reality, failed to be truly representative and merely presented another opportunity for local political elites to dominate involvement in the political processes (Pelling, 1998; Fairclough, 2001;

Stern and Green, 2008). The analytical framework of Wamsler and Brink (2015) highlighted the differing views between top-down authorities and the grassroots and it was found to enrich understanding in throwing up the right questions. It marries an appreciation of the political economy with logical practical application and, in acknowledging various stages of the disaster cycle, it revealed imbalances in coping and adaptation between pre- and post-flooding approaches. Furthermore, the approach taken is a rare example of risk assessment with explicit acknowledgement for both used and unused capacities. As such, the use of the analytical framework of Wamsler and Brink (2015) can be supported and has huge potential for gathering the much-needed data to inform enhanced coping and adaptation to flooding.

CHAPTER 8

Conclusion

This concluding chapter provides a brief summary of what was said in each chapter followed by a reflection on the limitations of the research, its certainty and generalisability, and lessons learned from the research experience. Potential lessons for policy, practice or future research are noted and a concluding remark asserts the contribution made in answering the central research question.

Summary of chapters

Chapter 1 provided an introduction and stated the purpose and overall aims of the research to investigate coping with flooding in the Resistencia city region of northern Argentina and to contribute to pro-poor planning and adaptation and enhance health resilience. In referring to recent literature related to international development and international policy, the chapter provides justification for the study and introduces the researcher who is keen to contribute to more egalitarian forms of adaptation to flooding. Chapter 1 went on to summarise the broad challenges in addressing the research aims, most notably constraints in time and financial resources. A brief description of the environment, economy and society of the Resistencia city region was included within the introductory chapter to provide context and to further emphasise the worth of exploring the perceptions of stakeholders in the poor and flood-prone area. This was followed by a brief outline of the remainder of the study.

Chapter 2 provided a review of literature focused upon urban disaster risk and the concepts of vulnerability and resilience that are often associated with risk and adaptation to flooding. The chapter went on to cover debates over transition and transformation with respect to sustainable development and potential governmental interventions to address flooding in city regions prone to flooding. As well as 'top-down' measures to address flooding in city regions prone to flooding, the chapter moves on to consider debates in development literature in relation to inclusivity and participation and more 'grassroots' measures. Attention is also paid to the increasing importance given in the literature to interdisciplinary working and collaboration with respect to adaptation to flooding. Chapter 2 briefly concludes with identification of

the more detailed research questions that help form the basis of the remainder of the research project.

Chapter 3 made clear the key questions, research aims and objectives for the study and, in order to address them, explained the choices made with regard to the research design. As such, it was noted that the research philosophy for the study embodied a critical constructivist realism and epistemology through which the researcher could gain insights into the different experiences of flooding between professionals and politicians and the community. Since insights were sought into the socio-political and economic factors that lay behind the adaptive capacity of people and their involvement in measures to adapt to flooding, the study adopted an approach that employed qualitative methods in order to achieve the aims and objectives for the thesis and to inform development policy, practice and/or research related to planning and adaptation of city regions prone to flooding. As such, following a literature review and refinement of the methodology, it was decided to undertake two phases of semi-structured interviews to gather qualitative data; firstly, with key stakeholders amongst professionals and politicians (sample size of 43) and, secondly, with poor flood victims (sample size of 49). The project plan and timeframe are laid out within chapter 3, from ethical approval of the study in 2015 through to the projected dissemination of a summarised report based on the thesis in late 2019. Ethical considerations are noted, most particularly the provision of details of a local organisation with suitable counselling services if needed. In relation to quality assurance matters, note was made of best practice and health and safety guidelines that were provided to research assistants and participants, and the assurances that were given that privacy and confidentiality were to be maintained throughout the research process, with participant details kept private and confidential and interview responses kept securely. The chapter moves on to describe the personal background and experience of the researcher and his positionality throughout the research process in order to provide a degree of transparency and assurance that there has been methodological rigour.

Chapter 4 provided contextual background by reflecting on the history, society and environment of the Resistencia city region showing that, for a number of decades, it has been an inherently hazardous area for its vulnerable citizens. The chapter goes on to describe adaptation measures that have been taken to address the risk of flooding in

the Resistencia city region. The background showed why study of the area and the qualities of adaptation measures taken there has value for those concerned with disaster risk reduction.

Chapter 5, the first of the two results chapters, presented the perspectives of professionals and politicians and grouped responses using the framework suggested in the work of Wamsler and Brink (2015), i.e. based upon whether they related to: i) Reduction and avoidance of flooding hazards; ii) Reduction of vulnerability to flooding; iii) Preparedness for responding to flooding; iv) Preparedness for recovering from flooding. Distillation of the data revealed an imbalance in scope and emphasis in relation to pre- and post-flooding approaches, a lack of focus of the authorities on the conditions of the poorest and most vulnerable in society, a need for better coordination/co-operation amongst different sectors and a need for the political processes related to flooding to be more open and participatory.

Chapter 6, the second of the results chapters, presented the perspectives of poor flood victims using the same framework as used in Chapter 5. Distillation of the data revealed a striking difference between 'top-down' perspectives on flooding of the city authorities and the 'bottom-up' perspectives on flooding of poor flood victims. The responses of the poor flood victims tended, on the whole, to more strongly reflect an urgent need and desire for more measures to reduce vulnerability. In general, the interviews revealed considerable disappointment amongst poor flood victims with the role being played by local government, which was seen as disorganised and corrupt. It was clear that poor flood victims wished to be more involved in formal planning for the area, however they tended to feel there was little choice other than responding themselves to the risky circumstances they faced.

Chapter 7, the analysis and discussion chapter, considered the findings presented in the previous two chapters, compared the two data sets and identified how they had answered the research questions. The comparison could be more readily achieved since the same framework was used to highlight the emergent themes from both the responses given by professionals and politicians and those given by poor flood victims. Three key themes were identified. Firstly, it was noted that governmental approaches to dealing with flood risk for the Resistencia city region are oriented

towards physical measures and do not fully recognise the problems of the vulnerable poor. In highlighting this, the argument considered perspectives on the impacts and causes of flooding and the limited scope of current governmental approaches to coping and adaptation to it within the Resistencia city region. Secondly, it was noted that institutional structures and mechanisms for the Resistencia city region fail to support the adaptive capacities, solutions and opinions of citizens and fail to successfully integrate them in approaches to adaptation to flooding. In highlighting this, the argument considered perspectives on adaptive capacity and resilience and the limited role currently played by participatory approaches in coping and adaptation in the Resistencia city region. Thirdly, it was noted that urban governance in the Resistencia city region was perceived to be inadequate, with insufficient resourcing and with patronage politics and corruption considered to be so prevalent as to be guilty of foreclosing transformative approaches to adaptation to flooding, with a tendency for the rich to benefit at the expense of the poor. In highlighting these points, the argument considered perceptions that vulnerability was, to a large degree, attributable to inadequate urban and regional governance for risk reduction, inadequate resourcing and corruption.

Reflection on the limitations of the research, its certainty and generalizability, and lessons learned from the research experience

The research methodology used in undertaking the study is transferrable to a variety of settings, however there are limits to the degree to which the findings from a focus placed on the experience of the Resistencia city region can be generalised, given everywhere has its own particular challenges and geophysical peculiarities (Laws, Harper and Marcus, 2003). However, the knowledge acquired from the interviews provides useful fresh data for local government, civic society and the community in the Resistencia city region as it gave insights into how people felt about the persistent flooding problems they faced. The interviews were semi-structured and so the topics discussed would, inherently, be variable. Whilst efforts were made to steer the interviews in similar ways, the approach was less consistent than a structured quantitative approach such as a questionnaire. However, it is considered that the data gathered in this study can complement data gathered by means of more quantitative

approaches. As the interviews were, in the main, conducted in Spanish, there was a reliance on bi-lingual assistants. Given the financial and linguistic constraints, the study took a little longer than originally expected and the use of the siesta and the taking of winter holidays are socio-cultural aspects of society in Gran Resistencia that could have been factored in better to increase the efficiency of collecting data. The voluntary assistance of local people proved invaluable, however, and, in personal terms, the PhD study provided the researcher with the opportunity to both specialise in regional planning to address flooding and improve his Spanish.

Potential lessons for policy, practice or future research

In terms of the relationship noted in Chapter 2, that posits that disaster is a factor of hazard and vulnerability, the interviews revealed that the focus of professionals and politicians is weighted heavily towards a focus on hazard rather than vulnerability. In practice, local government has focussed its efforts upon addressing the threat of river flooding, though the costly major engineering works have still failed to rid the city region of its flooding. Intense rainfall continues to be a major contributory factor to the ongoing flooding and, concurrent with the work of Pelling and Wisner (2009), it is apparent that the 'ratchet effect' of continual impacts upon the vulnerable poor in the Resistencia city region is often being overlooked by the authorities. Whilst it is understandable that widespread river flooding lives long in the memory of many people in the area, the city region needs to be planned and managed better in ways that have a greater focus on addressing the intense rainfall and the shifts in weather patterns as a result of climate change. Certain streets encounter significant flooding as a result of a few hours of heavy rainfall, in some instances as a result of a failure of the local government to arrange for adequate waste management and removal of rubbish from the flood drains. Better maintenance of drainage systems, both before and during flooding episodes, is a clear recommendation from this study, along with the need for a better balance between pre- and post-flooding adaptation measures and a more pro-poor focus that recognises the importance of preparedness for responding to and recovering from future flooding. A 'blame culture' exists whereby many professionals often blame the vulnerable poor for their risky circumstances, and many poor flood victims point to corruption within government as being a major contributor to their vulnerability. It is clear that political processes need to be both more transparent and

more participatory to help establish a more transformational culture that fosters sustainable development and broader disaster risk reduction consciousness that enables greater resilience to be developed. During and after flooding events, there is a need for better coordination amongst professionals and between professionals and the community to ensure adequate resources are distributed to those who need it most. The research project provided valuable insights in relation to disaster risk reduction and the qualitative data gathered could help inform the development of further research projects related to adaptation to flooding that are either qualitative or quantitative. Furthermore, the data and analysis from this study could inform the development of policy and practice in ways that enhance the health resilience of internally displaced persons and vulnerable communities within the city region whilst, simultaneously, reflecting upon the value of the analytical framework itself and its associated themes/categorisations. Further lines of enquiry could take a closer look at the sociology of health, the epidemiology of disease and issues of gender and social exclusion in the Resistencia city region, especially in identifying differences and linkages between urban, rural and peri-urban settings.

Concluding remark

In seeking to answer the key questions, the research has provided further insights that can inform appropriate policies to bolster community resilience, guard against future threats/risks and foster health equity in areas prone to flooding. It is clear that standards of environmental management have been lax in much of the development in the Resistencia city region, and there is an obvious need to ensure that development projects are planned and implemented for sustainability in both ecological and social terms. There is a need for 'joined-up thinking' between actors/stakeholders working in social and economic policy, spatial planning, environmental management, and health services and the community itself in forms of collaboration to ensure environmental challenges are mitigated, resilience is optimised and to enable the 'mainstreaming' of a culture of adaptation within local development policy, planning and management. Since a sizeable proportion of the population is vulnerable and suffers from living in hazardous circumstances, there is an obvious need for more statistics to illustrate the degree of vulnerability encountered and to help inform more pro-poor disaster risk reduction policy and practice. It is hoped that this thesis provides

useful further information within the evolving academic natural hazard paradigm as we seek to empower ourselves to deal with rapid environmental change.

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